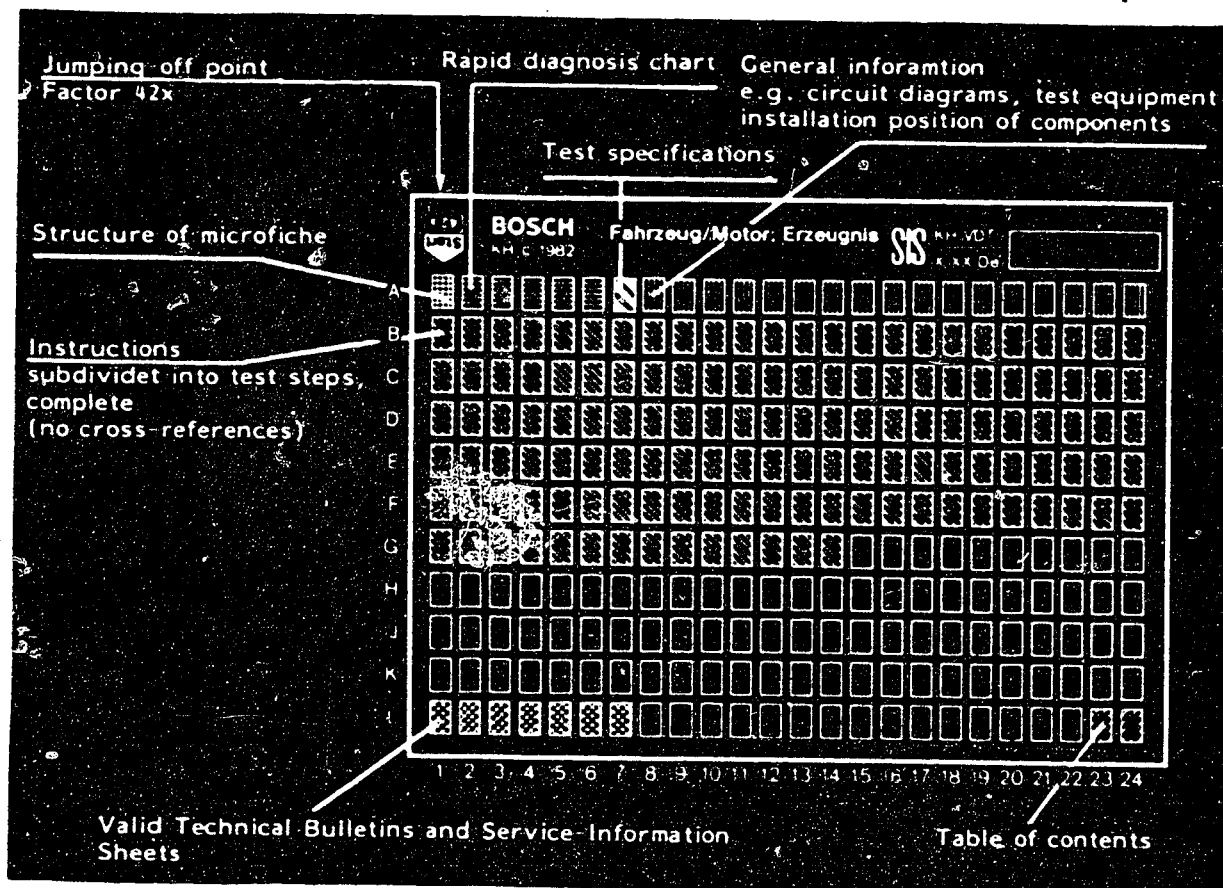


Structure of microfiche



1. Read from left to right

2. Title of microfiche (appears on each coordinate)

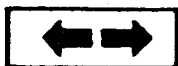
E16	Product/assembly/test step	
	Vehicle/engine	

Coordinate

3. Limits of section



Beginning



Mid-section



End



One-page section

4. References to relevant test steps in test specifications; coordinate e.g. C6

C6

A1

Trouble-shooting program



1. Rapid diagnosis chart

The following rapid diagnosis chart makes it possible for the experienced expert to quickly check the electrical/electronic part of the ignition system using normal workshop test equipment.

The rapid diagnosis chart contains the following information:

- Customer complaint
- Cause of the trouble
- Test instructions (if no coordinate given on the right, further possibilities for testing are indicated).
- Coordinates for detailed trouble-shooting.

If detailed information and instructions on trouble-shooting are necessary, always proceed according to the trouble-shooting program starting on coordinate B 1.



Rapid diagnosis chart

Customer complaint (symptom of trouble)

1. Starting motor operates, but engine fails to start

2. Rough idling

3. Poor throttle response

4. Engine lacks power

5. Misfiring

6. Fuel consumption too high

7. Engine pings when accelerating

8. Backfiring

9. Engine becomes too hot

Cause of trouble

Test instructions

Coordinates

●	●	●	●	●	●		●	Spark plugs defective	Assess using ignition oscillograms or remove spark plug and make visual examination.	-
●	●	●	●	●	●	●	●	Ignition timing incorrect	See Autodata test specifications	-
●	●	●	●	●				Shunt on secondary side	Assess ignition coil, ignition distributor, ignition harness and spark plug using ignition oscillogram or make visual examination.	-
●	●	●	●	●				Open circuit on secondary side	Assess ignition coil, ignition distributor, ignition harness and spark plug using ignition oscillogram, or test for continuity using ohm-meter	-
●								Open circuit on primary side	Test voltage supply to trigger box or test primary circuit	C 1
●	●	●	●	●				Ignition coil defective	Make visual examination, electrical test	B 5

A3

Rapid diagnosis chart
TCI-h, conversion kit



A4

Rapid diagnosis chart
TCI-h, conversion kit



Rapid diagnosis chart

Customer complaint (symptom of trouble)

1. Starting motor operates, but engine fails to start

2. Rough idling

3. Poor throttle response

4. Engine lacks power

5. Misfiring

6. Fuel consumption too high

7. Engine pings when accelerating

8. Backfiring

9. Engine becomes too hot

Cause of trouble

Test instructions

Coordinates

		●	●	●	●				Interference-suppression resistors defective	Assess using ignition oscillogram or perform resistance measurement.	-
	●	●	●		●	●	●	●	Centrifugal advance defective	See Autodata test specifications	-
		●	●		●	●		●	Vacuum advance defective	See Autodata test specifications	-
●									Trigger box defective	Test peak-coil-current cut-off, primary voltage.	B 11
●									Ignition distributor pickup system defective	Test voltage supply and operation of magnetic pickup assembly.	C 5 C 7 C 9
●	●	●	●	●					Engine-speed limiter defective	Test cut-out speed, or perform visual examination.	
●									Firing sequence incorrect	See Autodata test specifications	

A5

Rapid diagnosis chart
TCI-h, conversion kit



A6

Rapid diagnosis chart
TCI-h, conversion kit



2. Test Specifications

Ignition coil up to FD 048 primary	0.6...0.9	B5
Ignition coil up to FD 048 secondary	2.7...3.9 k Ω	
Ignition coil as from FD 049 primary	0.6...1.0	B9
Ignition coil as from FD 049 secondary	7.0...10.1 k Ω	

Voltage supply, trigger box	12...14 V	B9
Voltage supply, ignition coil	10 V	

Peak-coil-current cutoff after approx. 1 s	approx. 5 V	B11
After cutoff	0 V	

Primary voltage at engine idle; trigger box 0 227 100 100, ...103 (Test unnecessary for trigger box 0 227 100 118)	330...390 V
---	-------------

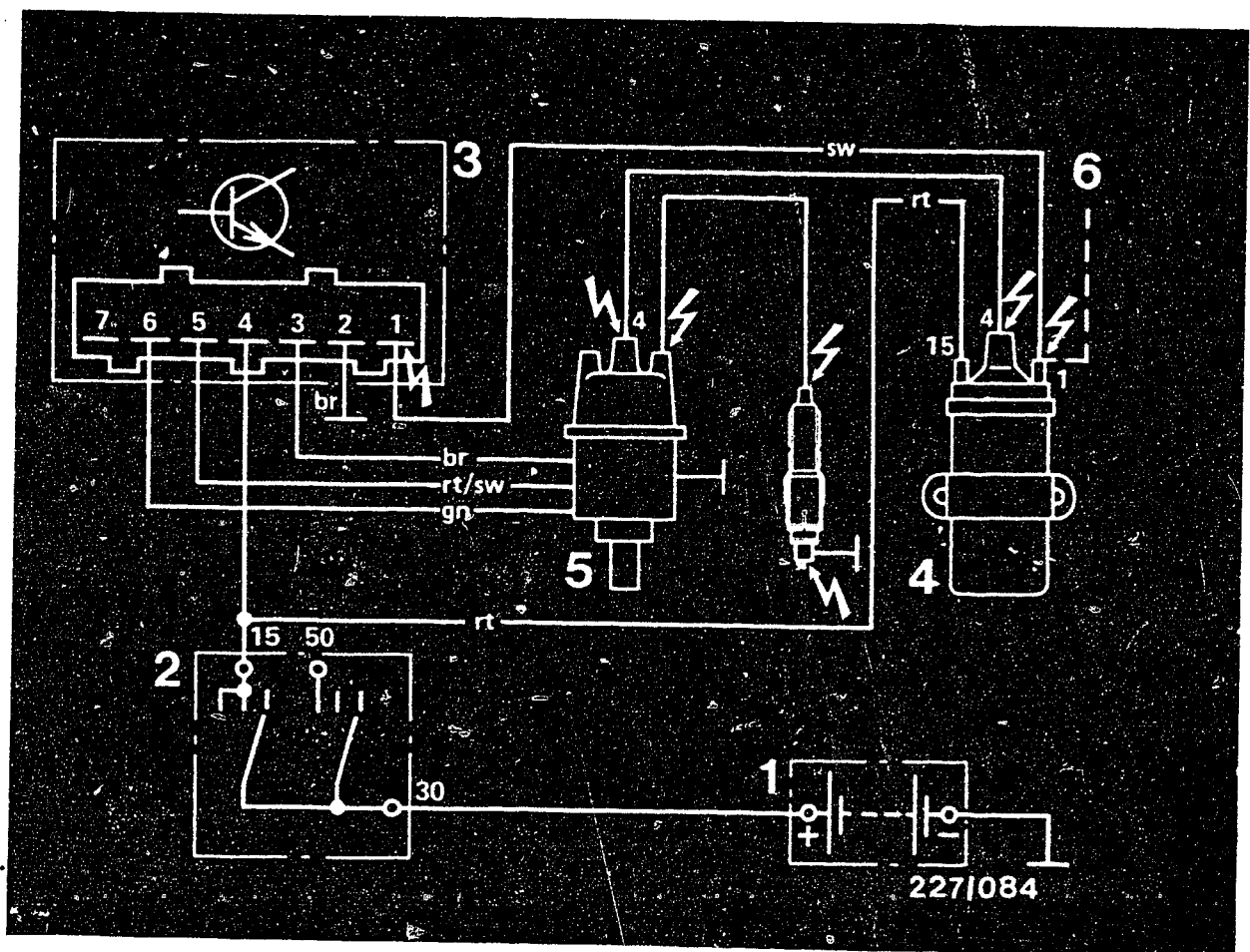
Voltage supply, vane switch max.	1...3.5 V below U_B	C5
Vane switch function, vane outside air gap	0...0.7 V	

Vane switch function, vane outside air gap	0...0.7 V	C7
Vane inside air gap	1.8 V... U_B	

Vane inside air gap	1.8 V... U_B	C9
---------------------	----------------	-----------

Refer to the Autodata Test Specs for the adjustment figures for ignition, idle speed, exhaust gas, valve clearances etc.





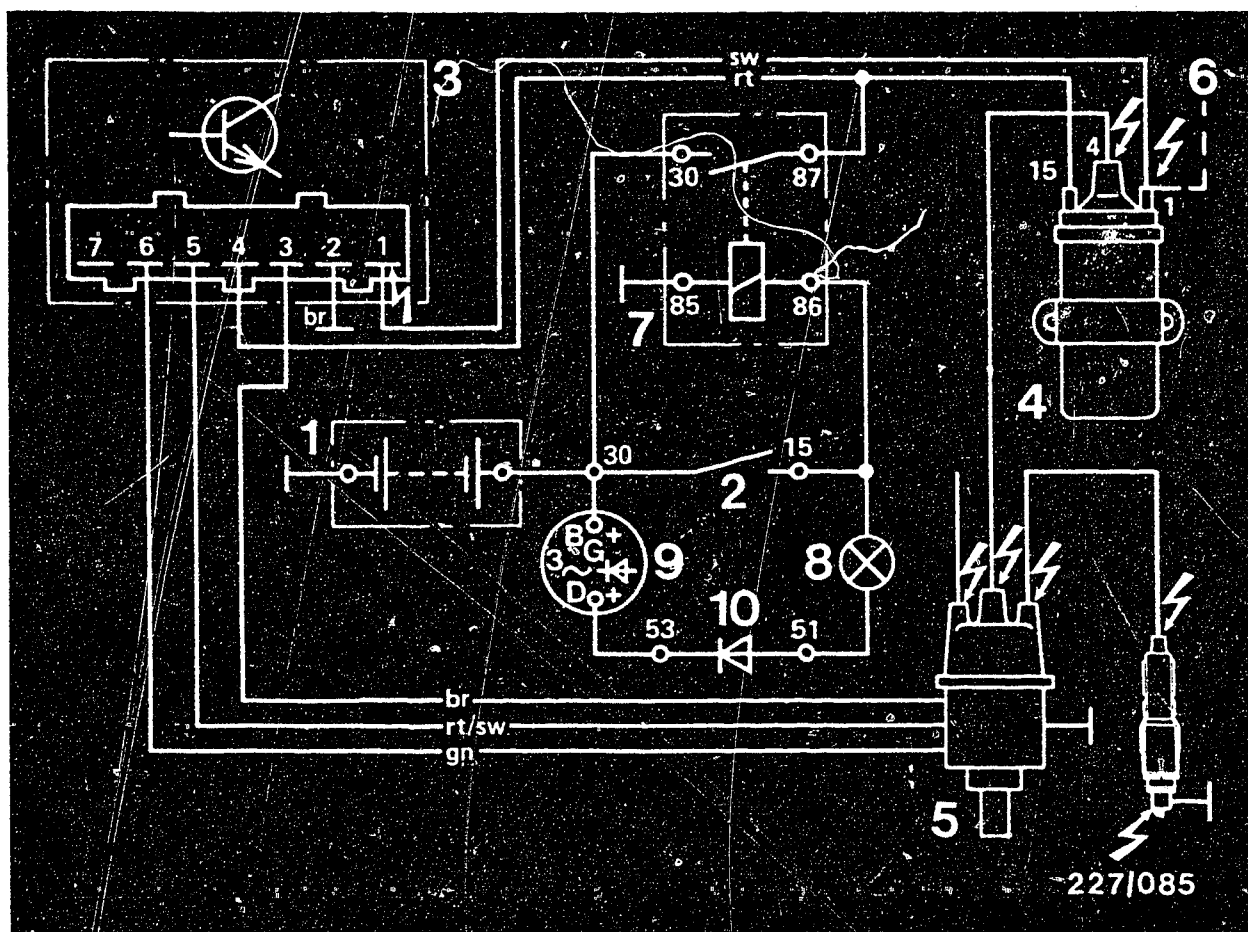
- 1 = Battery
- 2 = Ignition/Starting switch
- 3 = Trigger box
- 4 = Ignition coil
- 5 = Ignition distributor
- 6 = to tachometer

- br = brown
- gn = green
- rt = red
- sw = black

⚡ = Dangerous voltages (400 V - 25 kV)

3. Electrical wiring diagram - normal circuitry

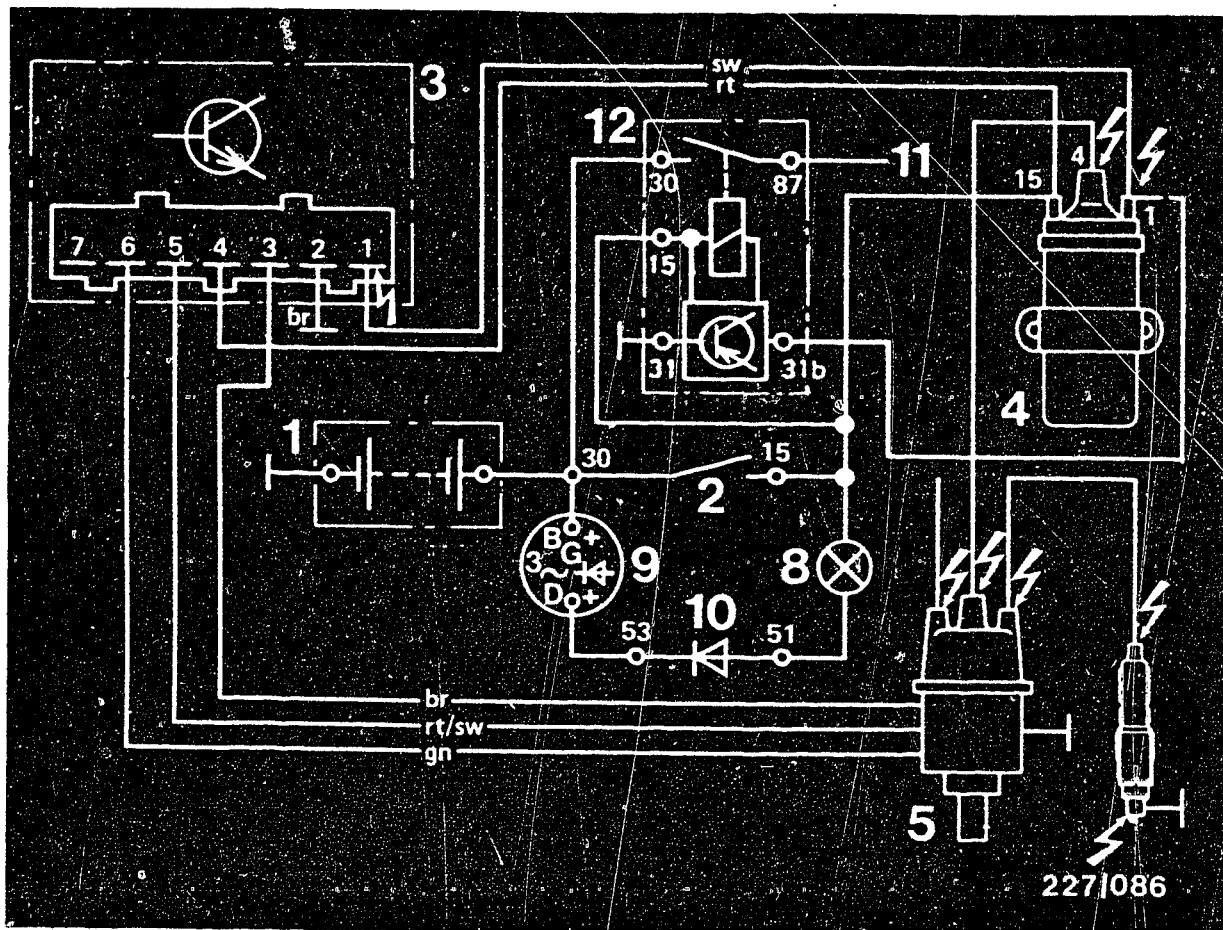




- | | |
|------------------------------|---------------------------|
| 1 = Battery | 7 = Relay |
| 2 = Ignition/Starting switch | 8 = Charge indicator lamp |
| 3 = Trigger box | 9 = Alternator |
| 4 = Ignition coil | 10 = Blocking diode |
| 5 = Ignition distributor | br = brown rt = red |
| 6 = to tachometer | gn = green sw = black |

⚡ = Dangerous voltages (400 V - 25 kV)

3.1 Electrical wiring diagram - Circuit for vehicles with run-on (with the ignition switched off)

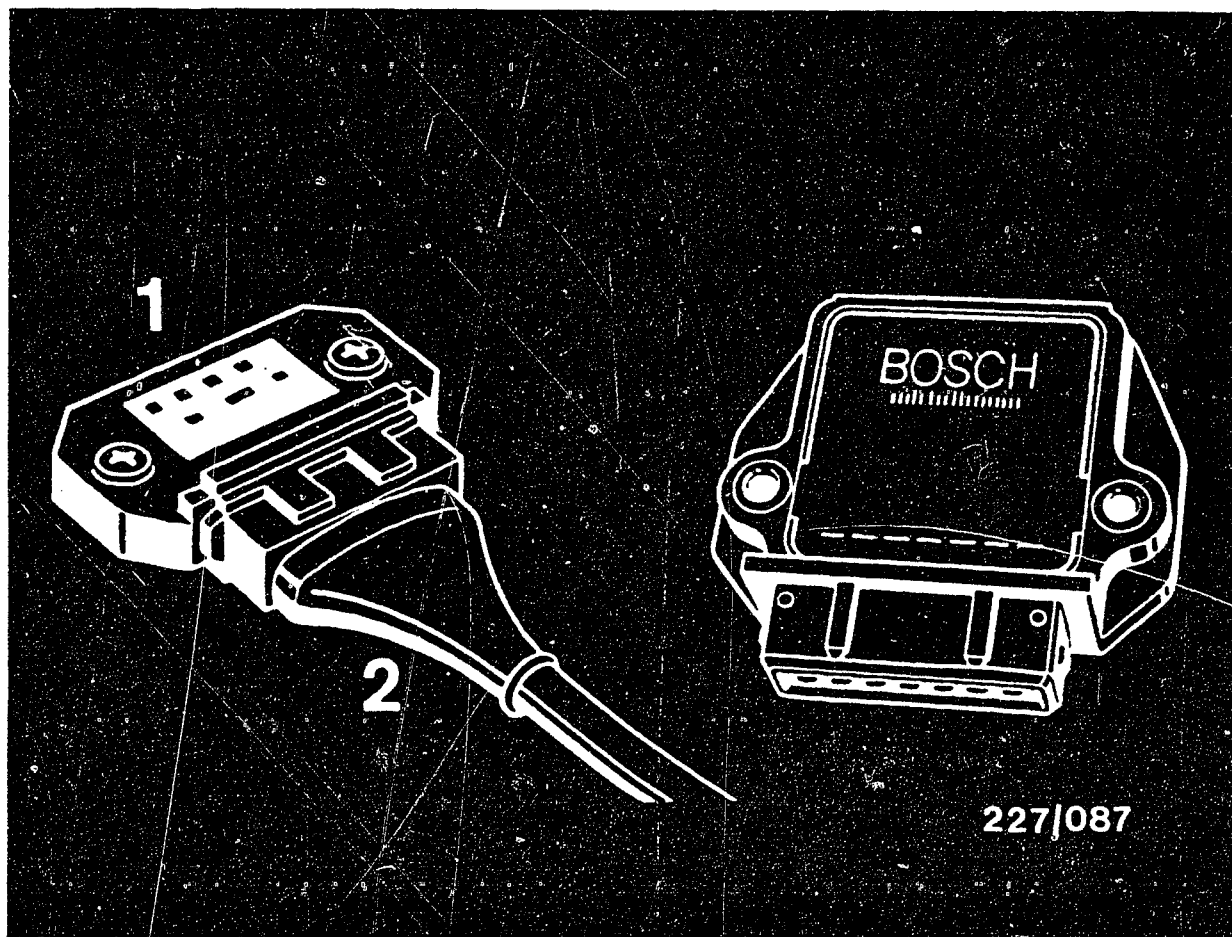


- | | |
|------------------------------|-----------------------------|
| 1 = Battery | 8 = Charge indicator lamp |
| 2 = Ignition/Starting switch | 9 = Alternator |
| 3 = Trigger box | 10 = Blocking diode |
| 4 = Ignition coil | 11 = to fuel supply pump |
| 5 = Ignition distributor | 12 = Electrical speed relay |
| 6 = to tachometer | br = brown rt = red |
| | gn = green sw = black |

⚡ = Dangerous voltages (400 V - 25 kV)

3.2 Electrical wiring diagram - Circuit for vehicles with K-Jetronic





1 = TCI-h trigger box
2 = Trigger-box plug

4. Installation location of the individual components

The trigger box is installed in the engine compartment.

5. Necessary test equipment, aids

Motortester e.g.	MOT 002.00	0 684 000 200
Spark gap e.g.		
Ignition-coil and condenser tester or	EFAW 106 A	0 681 100 001
Single spark gap	EF 1177/7	1 684 531 000
5 k Ω sleeve-type suppressor		0 356 500 001
Ohmmeter	ETE 014.00	0 684 101 400
or e.g.	Pontavi Wh2	Commercially available
Ammeter		Commercially available
(with mA measuring range)		
Voltmeter ETE 014.00 ($R_i \geq 50k\Omega/V$)		0 684 101 400
Voltmeter ETT 004 ($R_i \geq 50k\Omega/V$)		0 684 100 400
Voltmeter KTE 001.03 ($R_i \geq 50k\Omega/V$)		0 684 400 103
Voltmeter MOT 001.03 ($R_i \geq 50k\Omega/V$)		0 684 000 103
Voltmeter MOT 201 ($R_i \geq 50k\Omega/V$)		0 684 000 201
Voltmeter MOT 202 ($R_i \geq 50k\Omega/V$)		0 684 000 202



6. Danger of accident on electronic ignition systems

Increased demands of modern engines on the ignition system combined with the desire for freedom of maintenance have recently led to electronic ignition systems being fitted as standard. Usually the ignition power of electronic systems (of almost all manufacturers) is higher than that of conventional systems, and there are signs of further increases in power. Electronic ignition systems thus reach a power range which can be highly dangerous if live parts or terminals are touched (both on the primary as well as the secondary sides).

In this connection we should like to point out that the VDE regulations, in particular VDE 0104/7.67 and/or the respective national regulations must be followed when testing or working on the ignition system.

The ignition should always be switched off when working on the ignition system (switch off ignition or voltage source). Such work includes:

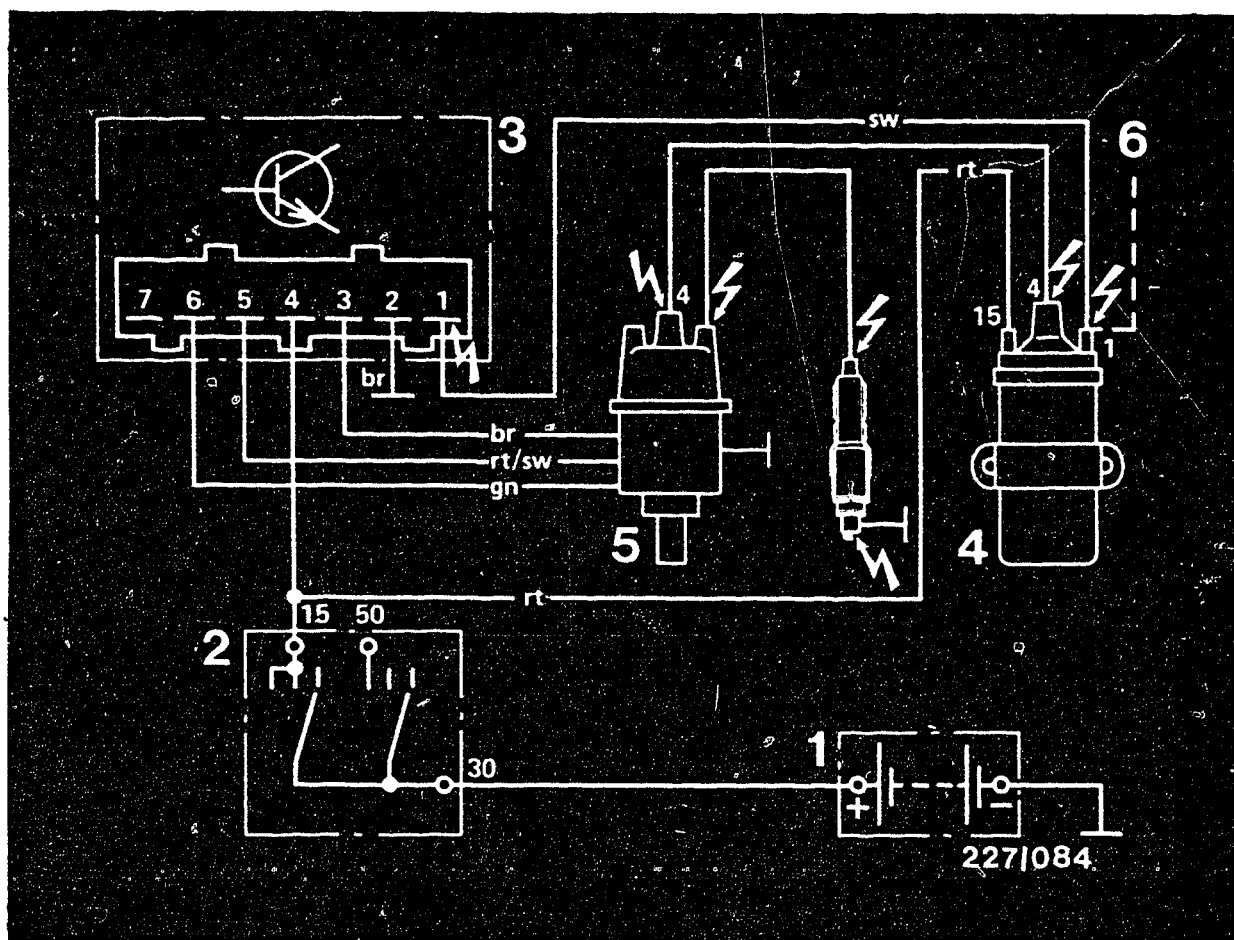
- Connecting of engine test equipment (timing light, dwell-tach tester, ignition oscilloscope, etc.).
- Replacing parts of the ignition system (spark plug, ignition coil, ignition distributor, H.T. ignition cable, etc.).



If, while testing the ignition system or during adjustment work on the engine (e.g. carburettor), it becomes necessary to switch on the ignition (switch on ignition or voltage source), the above-mentioned dangerous voltages occur over the entire system.

The danger of accident exists, therefore, not only on the individual assemblies of the ignition system (e.g. ignition distributor, ignition coil, trigger box, ignition harness), but also on the wiring harness (e.g. tachometer connection, diagnostic plug), at plug-in connections and test equipment.





- 1 = Battery
- 2 = Ignition/Starting switch
- 3 = Trigger box
- 4 = Ignition coil
- 5 = Ignition distributor
- 6 = to Tachometer

- br = brown
- gn = green
- rt = red
- sw = black

⚡ = Dangerous voltages (400 - 25 kV)

Electrical wiring diagram

Taking an electronic ignition system as an example, the dangerous points are indicated by the high-voltage arrows.



7. Incorrect indication of engine speed, dwell angle and ignition point

In ignition systems with trigger boxes 0 227 100 100, .. 103, .. 118 (TI-h) with current limitation there may be an incorrect indication of engine speed, dwell angle and ignition point on testers.
For further details see Coordinates L 4 - L 8.



8. Important vehicle information

- During the compression test, either pull off the trigger-box plug or firmly connect terminal 4 of the ignition coil to ground using an extra cable (dangerous voltages, insulation damage at ignition coil, ignition distributor or ignition harness).

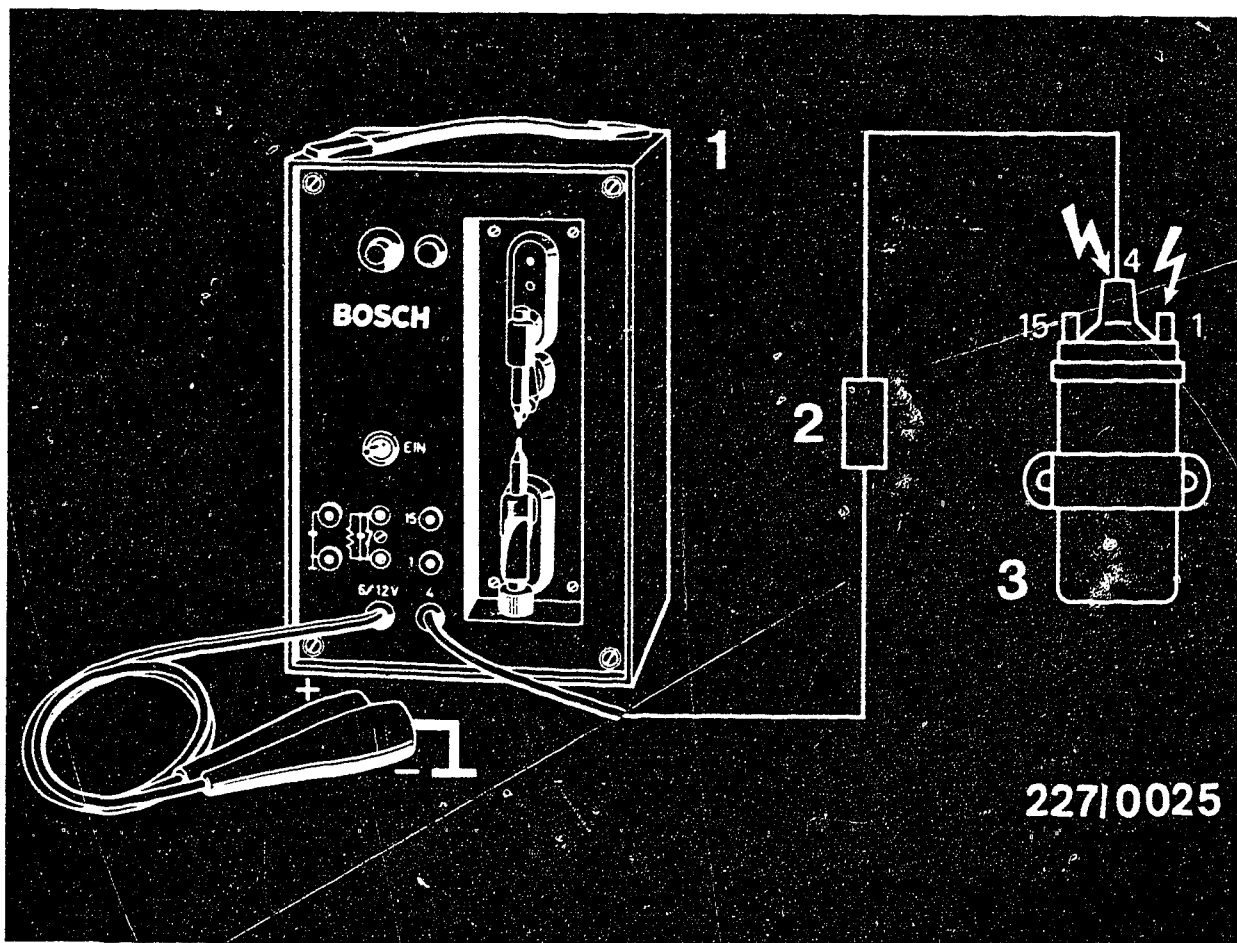
Note: The extra cable must be suppressed with at least 2 k Ω , e.g. with the interference-suppression sleeve (5 k Ω) 0 356 500 001.

- External voltage sources (e.g. Ommeter etc.) must not be connected to the ignition-distributor vane switch.

Care must be taken when switching the measurement range.

- Resistance measurements must only be performed with the ignition switched off or with the battery disconnected (measuring instrument defective).
- In order to prevent the trigger box from being irreparably damaged, the secondary side of the ignition system must have at least 2 k Ω interference suppression whereby the original distributor rotor with 1 k Ω interference-suppression resistor must be fitted (even in the case of radio and spark interference suppression do not use a 5 k Ω distributor rotor).





- 1 = Spark gap
- 2 = 5 kΩ sleeve-type suppressor
- 3 = Ignition coil
- ⚡ = Dangerous voltages (400 V - 25 kV)

- In order to prevent the trigger box from being irreparably damaged, when using a spark gap, an interference-suppression resistor of at least 2 kΩ must be connected between the spark gap and ignition coil terminal 4, e.g. sleeve-type suppressor (5 kΩ) 0 356 500 001.
- In the case of ignition distributors with engine-speed limitation the ignition distributor side terminal 4 must have 1 kΩ interference suppression. Operation without interference suppression will lead to the destruction of the trigger box.

- The holding springs of the distributor cap must not drop into the pickup system when the engine is being cranked and with the dust-protection cover removed.
- Do not disconnect the battery while the engine is running.
- Incorrect battery polarity will lead to the destruction of the magnetic pickup assembly of the ignition distributor and of trigger box and ignition coil.
- Do not use a starting aid with more than 16 V or a fast charger for starting.
- The specified ignition coil (see Part No.) must not be replaced with a different ignition coil.
- No suppression capacitor must be connected to ignition coil terminal 1 and terminal 15.
- Ignition coil terminal 1 must not be brought into contact with ground as a theft-proofing measure (ignition coil will be destroyed when ignition is switched on).
- No battery + or test lamp must be connected to ignition coil terminal 1 (trigger box will be destroyed).
- There must be no sparkover voltage from ignition coil terminal 4 to terminals 1 and 15 as this could lead to the destruction of the magnetic pickup assembly and the trigger box.
- Insulation faults (leakage currents and/or punctures etc) on the ignition-distributor cap can destroy the trigger box and the magnetic pickup assembly.



- Ignition cable from ignition coil terminal 4 to ignition distributor terminal 4 must not be disconnected during operation.
- The lines from the Hall generator to the trigger box must be laid separately from other lines. There must be at least 100 mm distance between Hall generator lines and the ignition cables and the line from terminal 1 of the trigger box to terminal 1 of the ignition coil (Hall generator will be destroyed).



9. Trouble-shooting program

Procedure

The trouble-shooting program is divided into 3 rows of boxes.

The left-hand row contains test instructions and test specifications.

The center row contains repair instructions.

The right-hand row contains the illustrations/terminal diagrams belonging to the text and the explanation of the items in the picture.

If the questions asked in the left-hand row can be answered conclusively with "Yes", then proceed to the next test down.

If the answer to the question is "No", branch to the center row and carry out the tests given there.

Before testing, make sure of the following:

Battery fully charged, fuel system O.K., engine mechanically O.K. (e.g. compression, valve clearance etc.). Ambient temperature/ignition system temperature 0° to +100°C (temperature has a considerable effect on measured values).

B1

Trouble-shooting program
TCI-h, conversion kit



Beginning of trouble-shooting program

Starting motor operates, engine fails to start or misfires or lacks power.

Yes

Continued on B 3

B2

Trouble-shooting program

TCI-h, conversion kit



Yes

Check the primary signal. If an oscilloscope or a rotational speed tester is not available, check whether an ignition spark forms at the spark gap.

Checking primary signal with oscilloscope:

Connect the oscilloscope to the ignition coil as per the operating instructions.

Start the engine.

The oscilloscope must display a primary voltage (the magnitude is unimportant).

Checking primary signal with rotational speed tester:

Connect the tester to the ignition coil as per the operating instructions.

Start the engine.

The tester must give a rotational speed reading (the magnitude is unimportant).

Ignition spark at the spark gap:

Pull ignition cable from terminal 4 of the ignition coil.

Connect the spark gap together with the sleeve-type suppressor (5 k Ω) to the ignition coil.

Set the spark gap to 5 mm.

Start the engine.

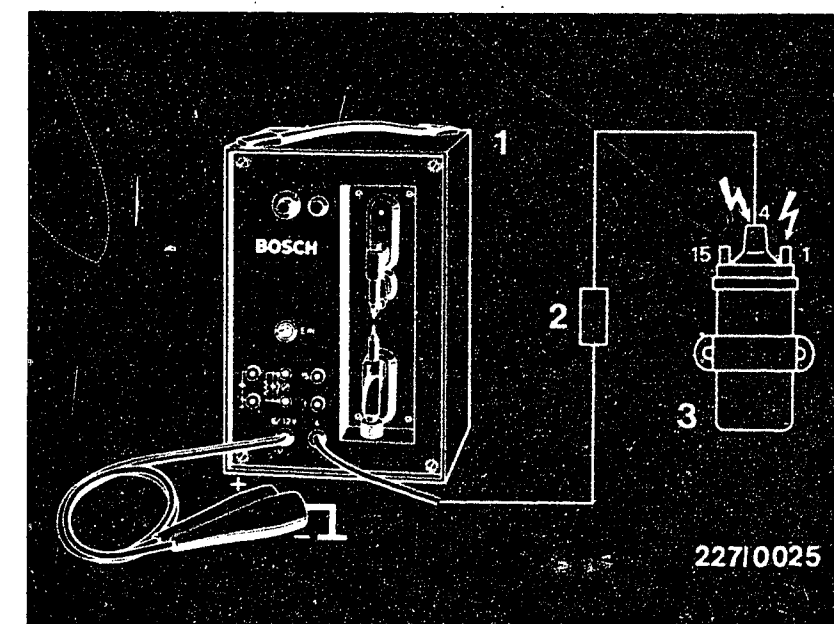
Sparks must form at the spark gap.

Is the primary signal, or sparks, present at the spark gap?

No

If a primary signal or a spark is not present, carry on testing at C1.

Tests as from B5 are not necessary.



1 = Spark gap

2 = Sleeve-type suppressor
5 k Ω

3 = Ignition coil

⚡ = Dangerous voltages
(400 V - 25 kV)

Yes

Cont'd B5/B6

B3

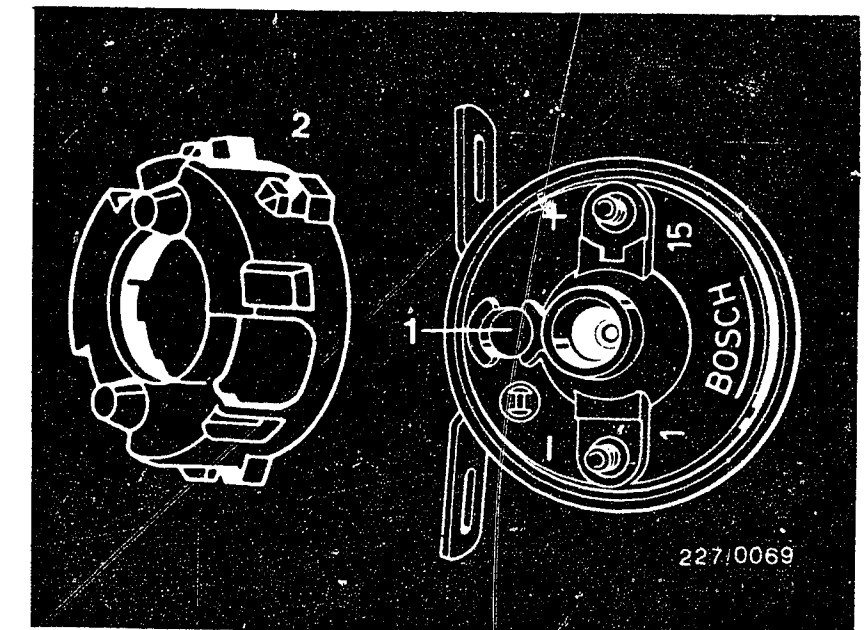
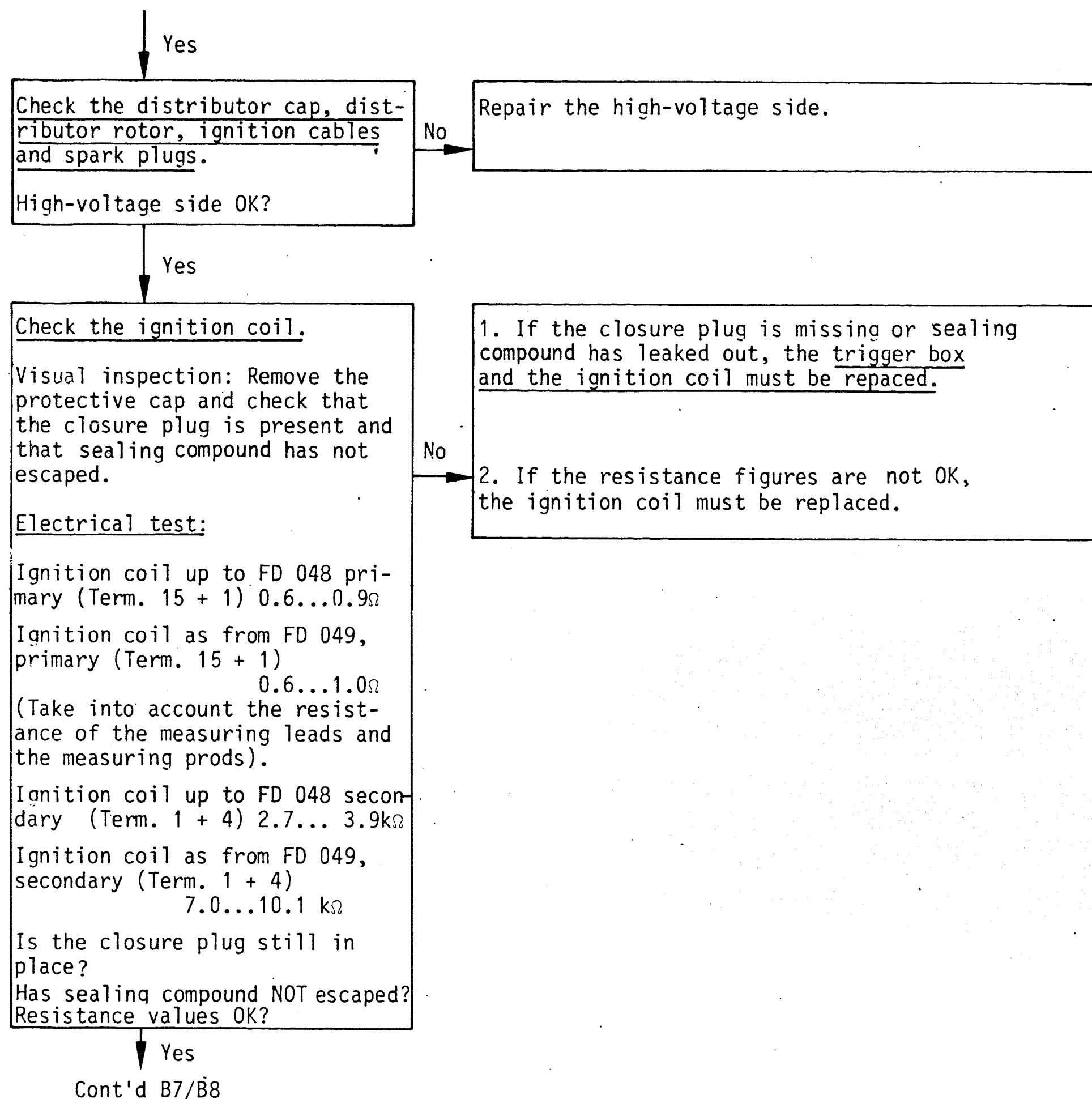
Trouble-shooting program
TCI-h, conversion kit



B4

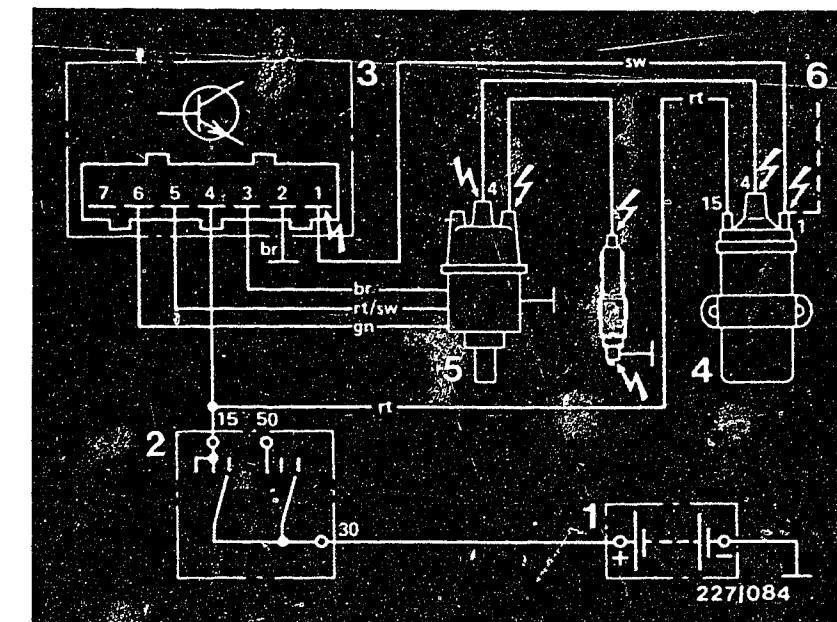
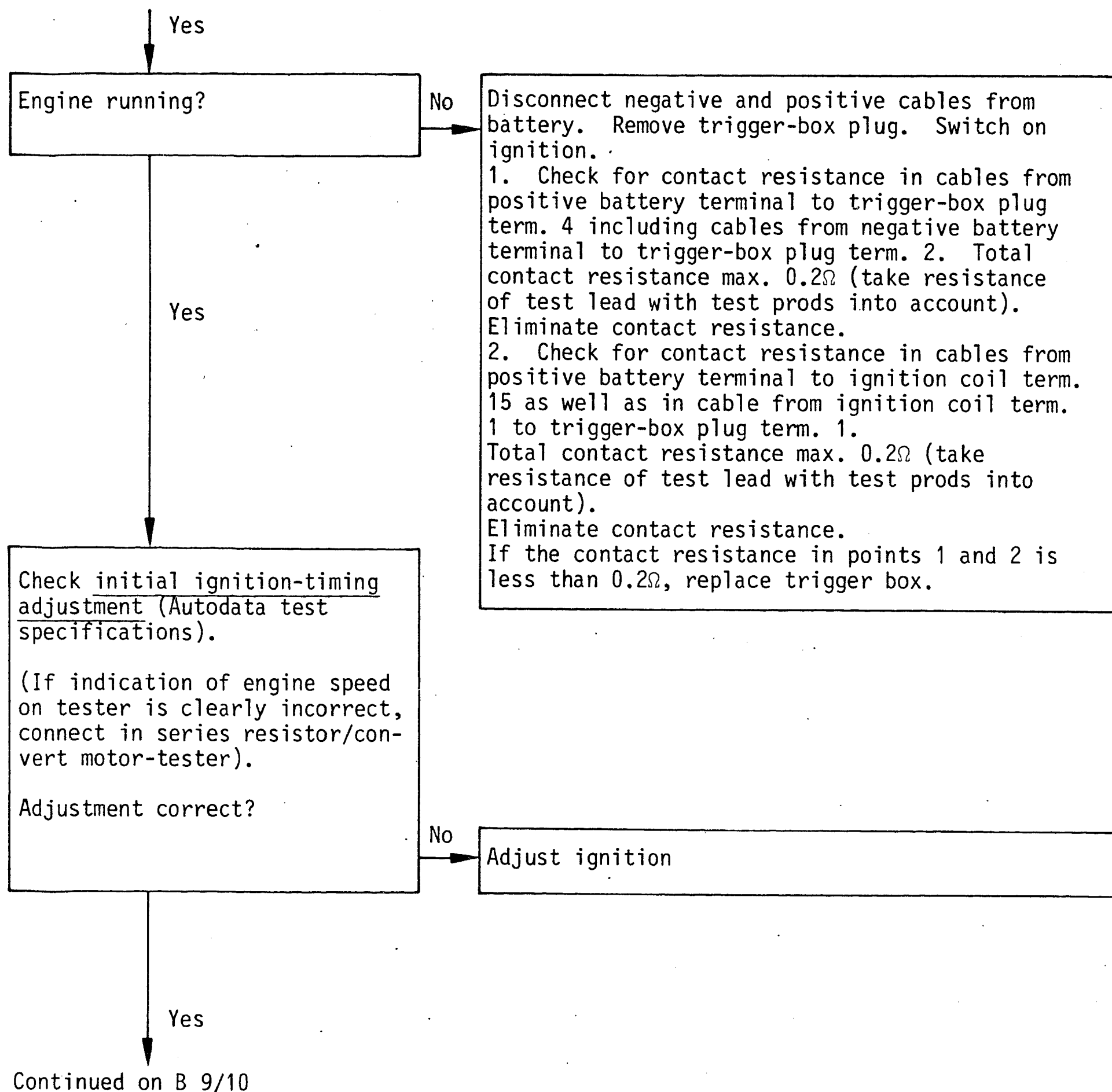
Trouble-shooting program
TCI-h, conversion kit





1 = Closure plug
2 = Protective cap

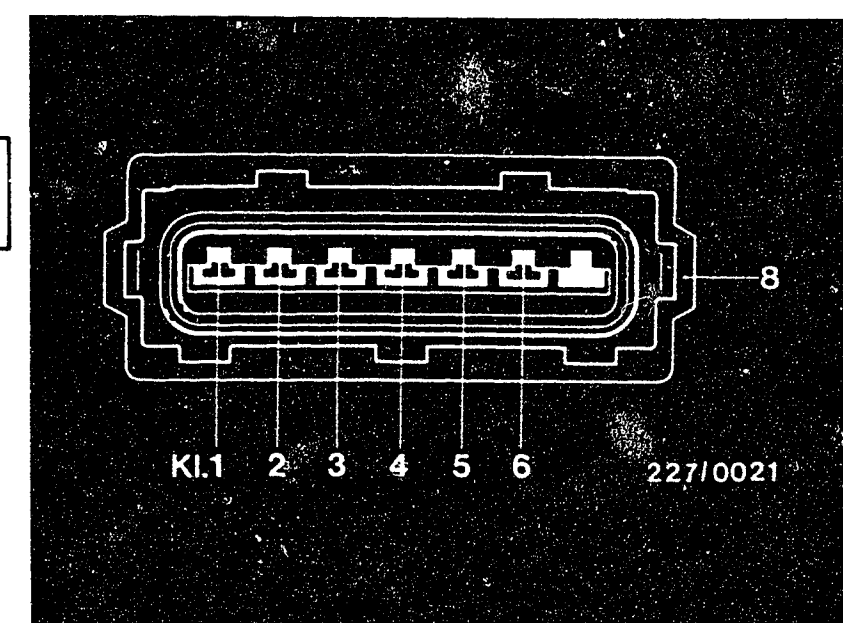




- 1 = Battery
- 2 = Ignition and starting switch
- 3 = Trigger box
- 4 = Ignition coil
- 5 = Ignition distributor
- 6 = To tachometer

⚡ = Dangerous voltages
(400 V - 25 kV)

8 = Trigger-box plug



B7

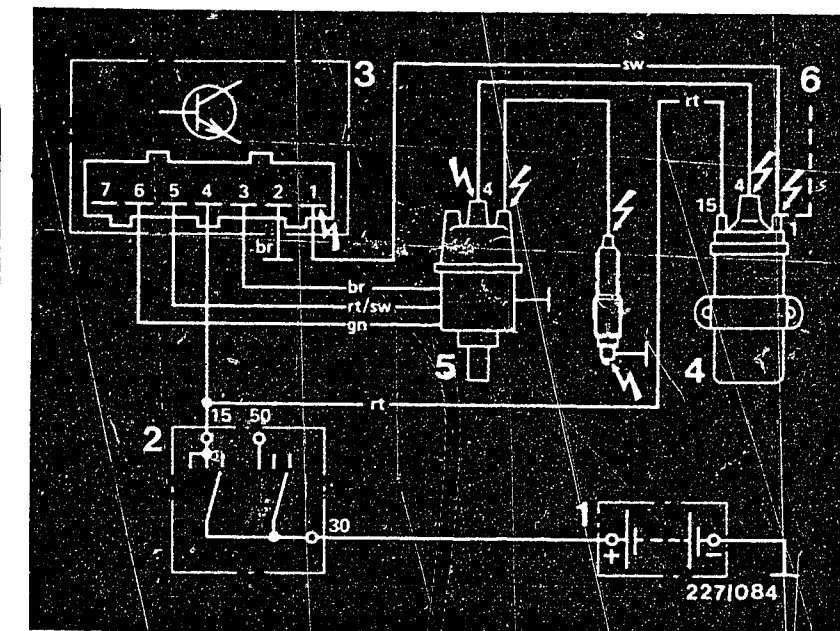
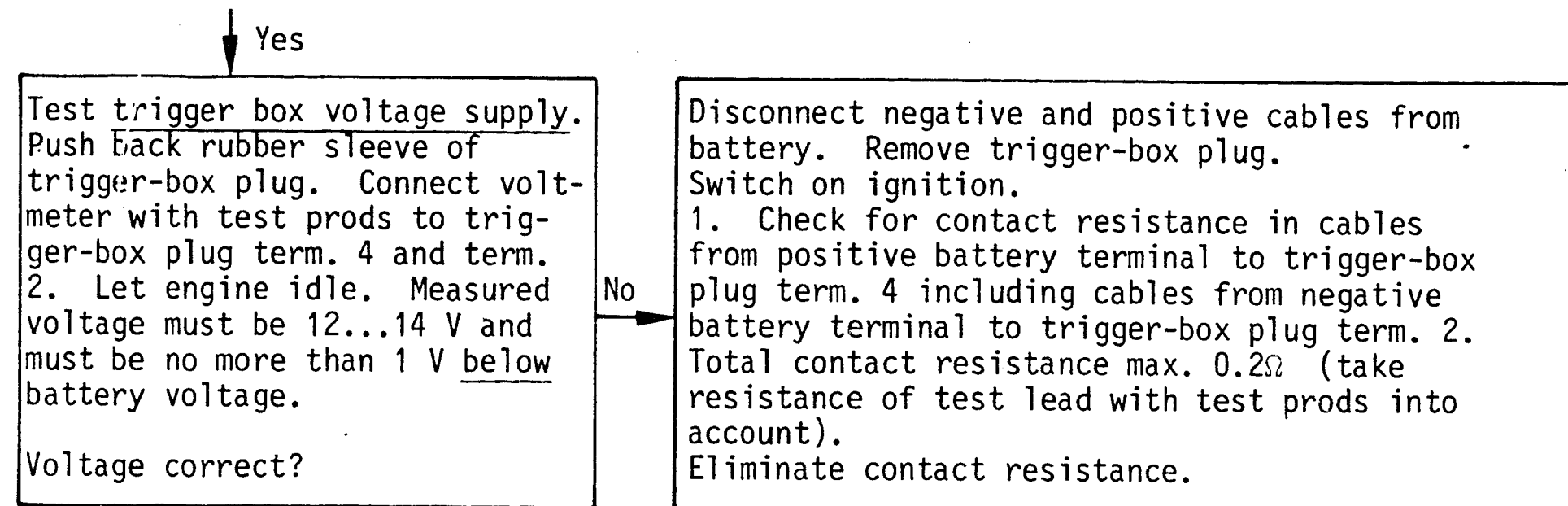
Trouble-shooting program
TI-h, conversion set



B8

Trouble-shooting program
TI-h, conversion set

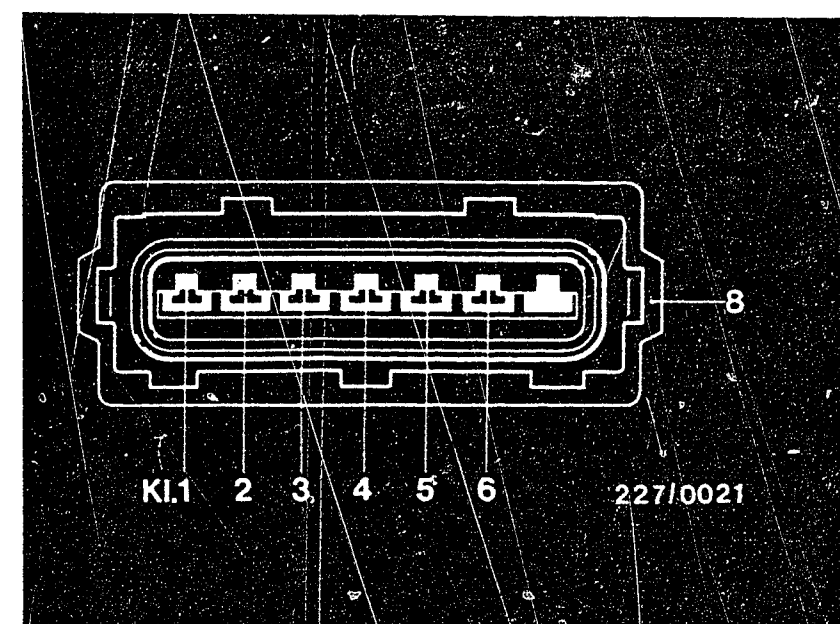
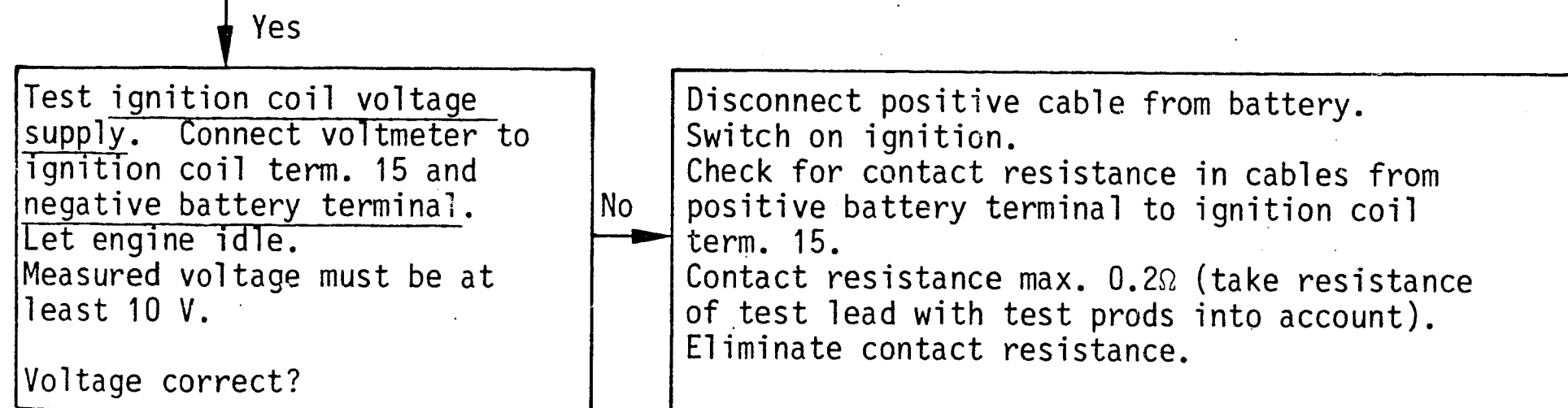




- 1 = Battery
- 2 = Ignition and starting switch
- 3 = Trigger box
- 4 = Ignition coil
- 5 = Ignition distributor
- 6 = To tachometer

⚡ = Dangerous voltages
(400 V - 25 kV)

8 = Trigger-box plug



Continued on B 11/12

B9

Trouble-shooting program
TI-h, conversion set



B10

Trouble-shooting program
TI-h, conversion set



Yes

Test peak-coil-current cut-off.
Connect voltmeter to ignition coil term. 15 and term. 1.
Remove distributor cap, distributor rotor and dust-protection cover.
Turn engine over by hand in direction of rotation until vane is completely in air gap of magnetic pickup assembly.
See illustration.
Switch on ignition.
Voltmeter deflects slightly (approx. 5 V) for approx. .1 sec.
Voltmeter must remove to 0 V.

Voltage (0 V) correct?

No

Replace trigger box and ignition coil.

Yes

Test primary voltage.
(if MOT 002.00 available).
Connect oscilloscope (MOT 002.00) to ignition coil as per operating instructions.
Let engine idle.
Measured primary voltage must be 330...390 V with trigger-boxes 0 227 100 100,...103.
See graph.
No test required for trigger box 0 227 100 113.

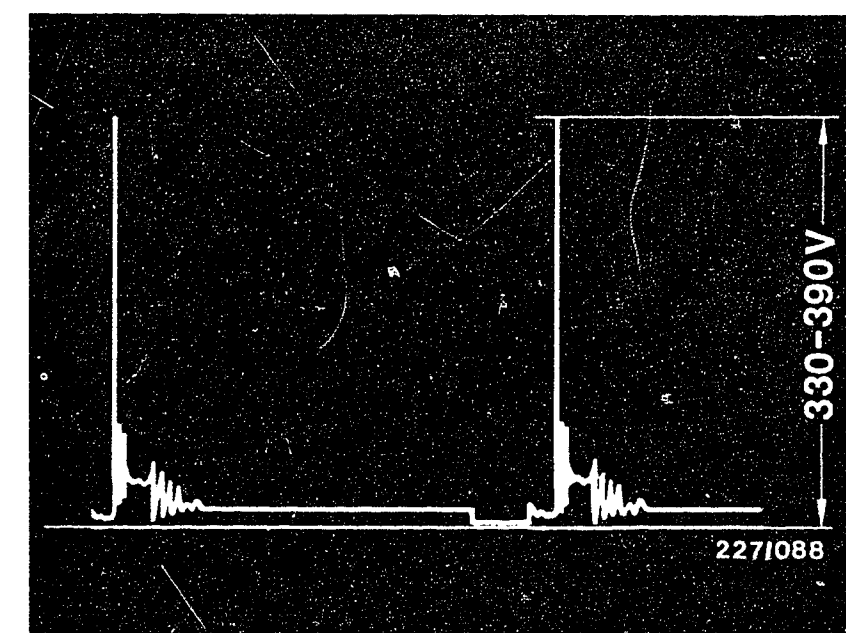
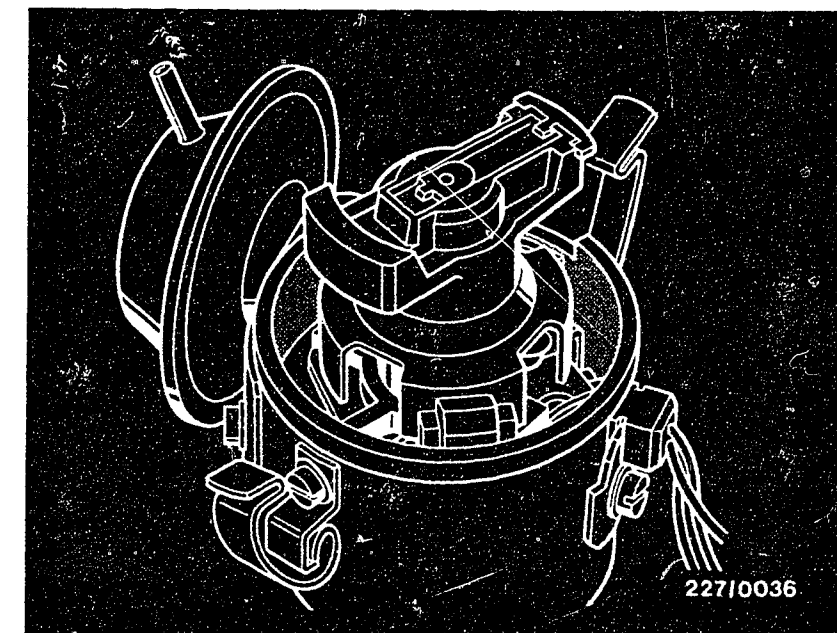
Voltage correct?

No

Replace trigger box.

Yes

Continued on B 13



B 11

Trouble-shooting program
TI-h, conversion set



B 12

Trouble-shooting program
TI-h, conversion set



Yes



Ignition system OK?

Test completed.

Tests starting at C 1, are now no longer necessary.

Note:

If customer complaint is not yet remedied, then check for further fault possibilities in the fuel system. Check if engine mechanically OK.



No primary voltage/no ignition spark
(Continued from B 3)

Yes

Test trigger box voltage supply.
Remove trigger-box plug.
Connect voltmeter to trigger-box plug between term. 4 and term. 2.
Switch on ignition.
Voltmeter must indicate battery voltage.
Voltage correct?

No

Check for open circuit in cables and terminals from ignition and starting switch to trigger-box plug term. 4 including ground cable term. 2.
Eliminate open circuit

Yes

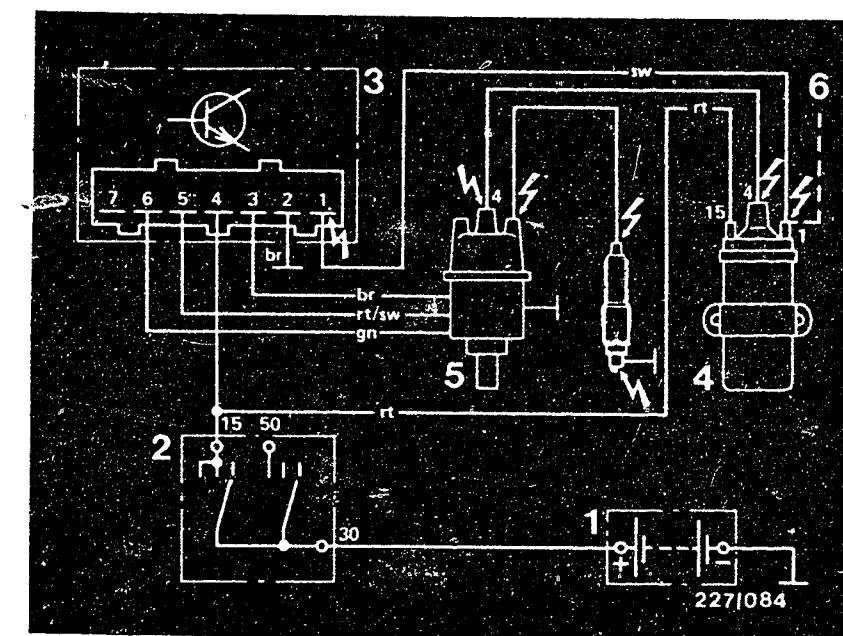
Test primary circuit.
Connect voltmeter to disconnected trigger-box plug between term. 1 and term. 2.
Switch on ignition.
Voltmeter must indicate battery voltage.
Voltage correct?

No

Check for open circuit in cable from ignition and starting switch to ignition coil term. 15, primary winding of ignition coil as well as cable from ignition coil term. 1 to trigger-box plug term. 1 including ground cable term. 2.
Eliminate open circuit.

Yes

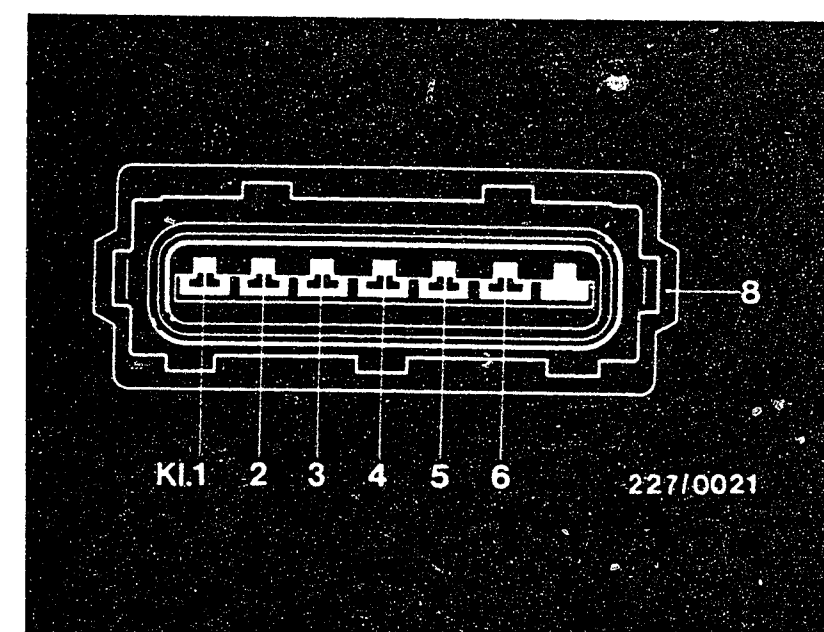
Continued on C 3/4



- 1 = Battery
- 2 = Ignition and starting switch
- 3 = Trigger box
- 4 = Ignition coil
- 5 = Ignition distributor
- 6 = To tachometer

⚡ = Dangerous voltages
(400 V - 25 kV)

8 = Trigger-box plug



C1

Trouble-shooting program
TI-h, conversion set



C2

Trouble-shooting program
TI-h, conversion set



Yes

Check the ignition coil.

Visual inspection: Remove the protective cap and check that the closure plug is present (see Fig.) and check that sealing compound has not escaped.

Electrical test:

Ignition coil up to FD 048, primary (Term. 15 + 1) $0.6...0.9\Omega$

Ignition coil as from FD 049, primary (Term. 15 + 1)
 $0.6...1.0\Omega$

(Take into account the resistance of the measuring leads and the measuring prods).

Ignition coil up to FD 048, secondary (Term. 1 + 4) $2.7...3.9k\Omega$

Ignition coil as from FD 049, secondary (Term. 1 + 4)
 $7.0...10.1k\Omega$

Is the closure plug still in place ?

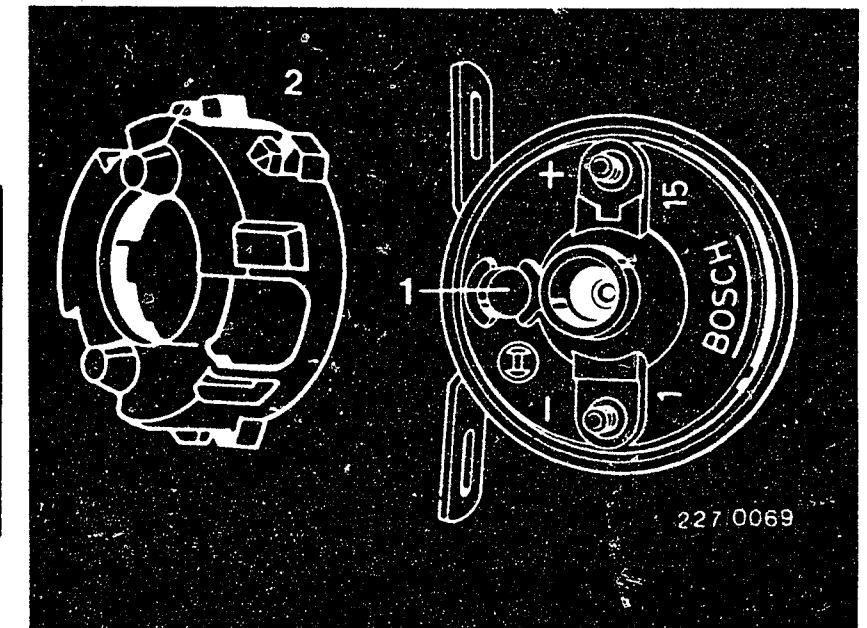
Sealing compound has NOT escaped?

Resistance values OK?

No

1. If the closure plug is missing or sealing compound has leaked out, the trigger box and the ignition coil must be replaced.

2. If the resistance figures are OK, only the ignition coil needs to be replaced.



1 = Closure plug

2 = Protective cap

Yes

Cont'd C5/C6

C3

Trouble-shooting program
TCI-h, conversion kit



C4

Trouble-shooting program
TCI-h, conversion kit

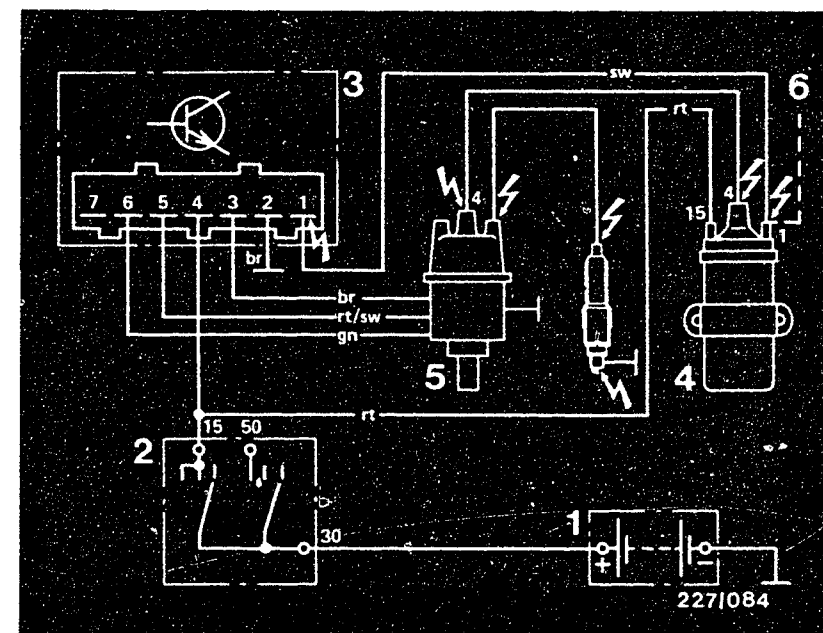


Plug on trigger-box plug.
Push back rubber sleeve of trigger-box plug.
Connect voltmeter with test prods to trigger-box plug term. 5 and term. 3.
Switch on ignition.
Indicated voltage may be 1.0 V to max. 3.5 V below battery voltage.

11

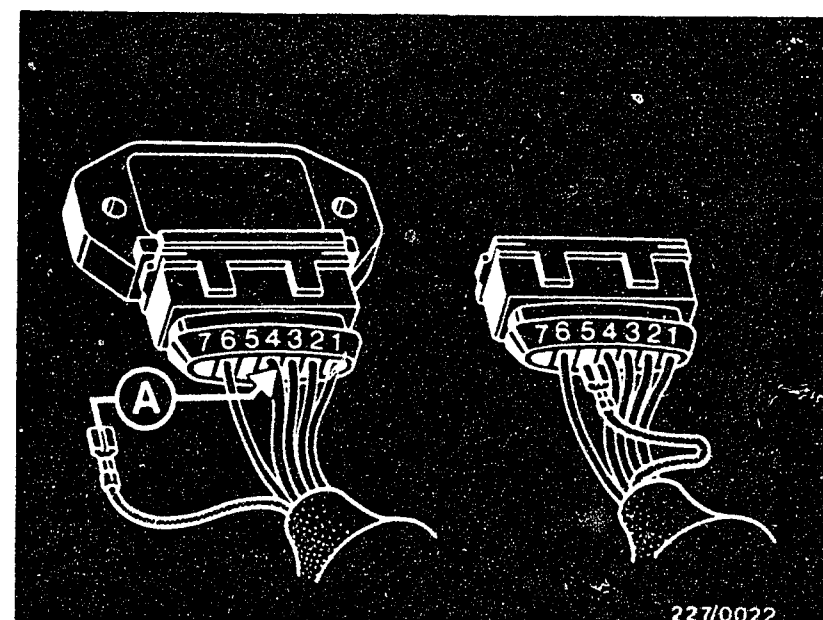
Plug on trigger-box plug.
Connect ammeter (mA measuring range) to removed cable term. 5 and trigger-box plug term. 4.
(See illustration).
Switch on ignition.

If the measured current is greater than 20 mA or is 0 mA, then magnetic pickup assembly is defective (replace ignition distributor). If the measured current is between 3 and 20 mA, replace trigger box.



- 1 = Battery
- 2 = Ignition and starting switch
- 3 = Trigger box
- 4 = Ignition coil
- 5 = Ignition distributor
- 6 = To tachometer

⚡ = Dangerous voltages
(400 V - 25 kV)



Yes

Test operation of magnetic pickup assembly.

Remove distributor cap, distributor rotor and dust-protection cover.

Turn engine over by hand in direction of rotation until vane is outside air gap of magnetic pickup assembly.

(See illustration).

For checking the magnetic pickup assembly use only a voltmeter with internal resistance (R_i) greater than 50 k Ω /V (otherwise incorrect measurement).

Connect voltmeter with test prods to trigger-box plug term. 6 and term. 3.

Switch on ignition.

Voltmeter must indicate 0-0.7 V.

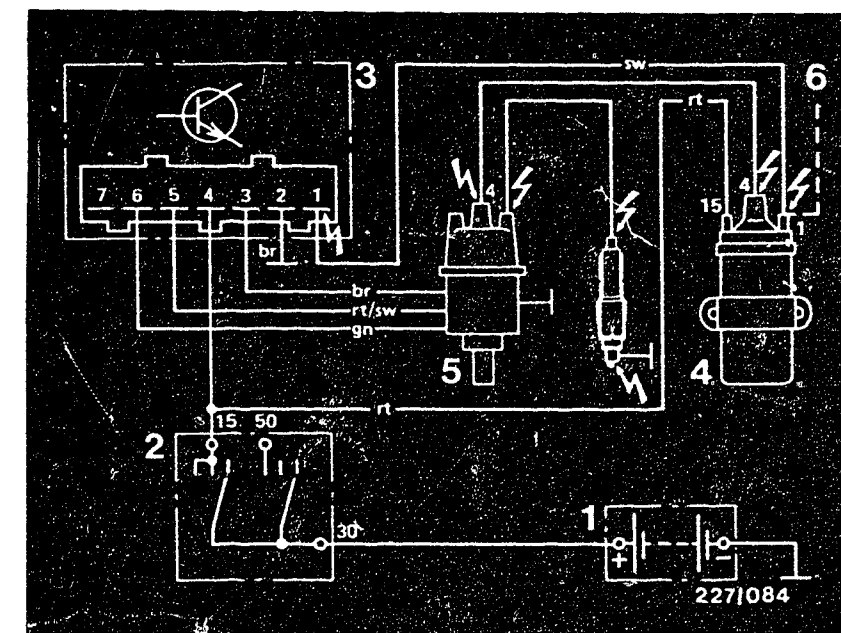
Voltage correct?

No

Replace magnetic pickup assembly.

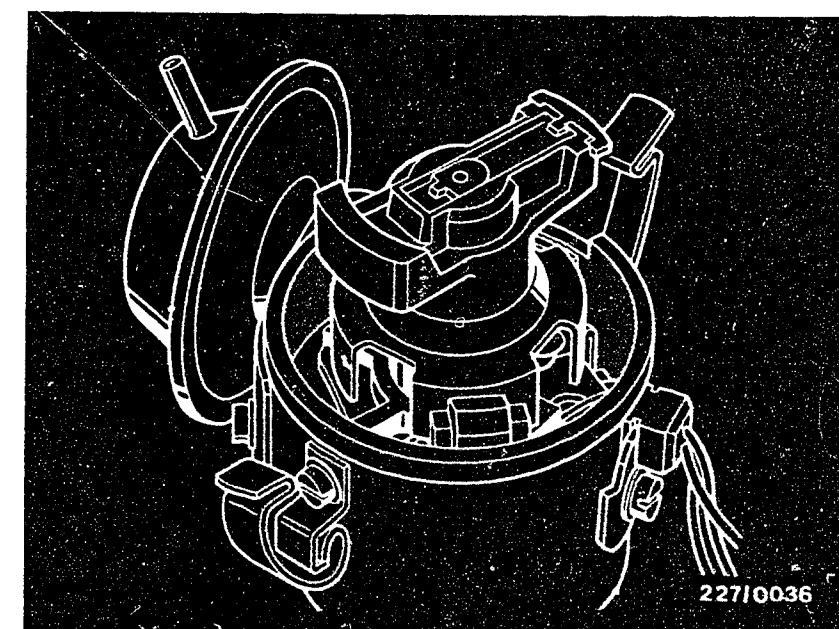
Yes

Continued on C 9/10



- 1 = Battery
- 2 = Ignition and starting switch
- 3 = Trigger box
- 4 = Ignition coil
- 5 = Ignition distributor
- 6 = To tachometer

⚡ = Dangerous voltages
(400 V - 25 kV)



C7

Trouble-shooting program
TI-h, conversion set



C8

Trouble-shooting program
TI-h, conversion set



Yes

Test operation of magnetic pickup assembly.
Turn engine over by hand in direction of rotation until vane is completely in air gap of magnetic pickup assembly. (See illustration). For checking the magnetic pickup assembly use only a voltmeter with internal resistance (R_i) greater than 50 k Ω /V (otherwise incorrect measurement). Connect voltmeter with test prods to trigger-box plug term. 6 and term. 3. Switch on ignition. Voltmeter must indicate 1.8 V to battery voltage.

Voltage correct?

No

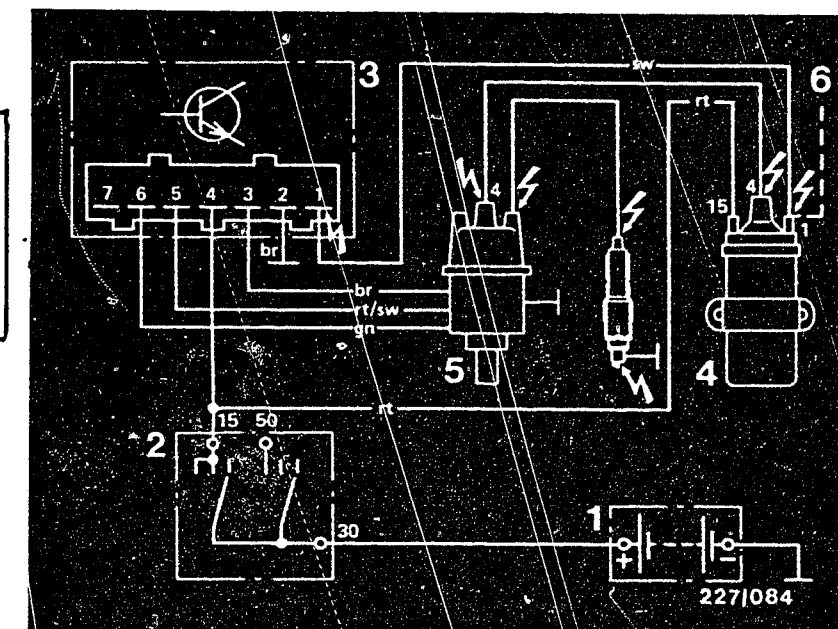
Replace magnetic pickup assembly.

Yes

Replace trigger box.
Test completed.
Tests from B 5 not necessary.

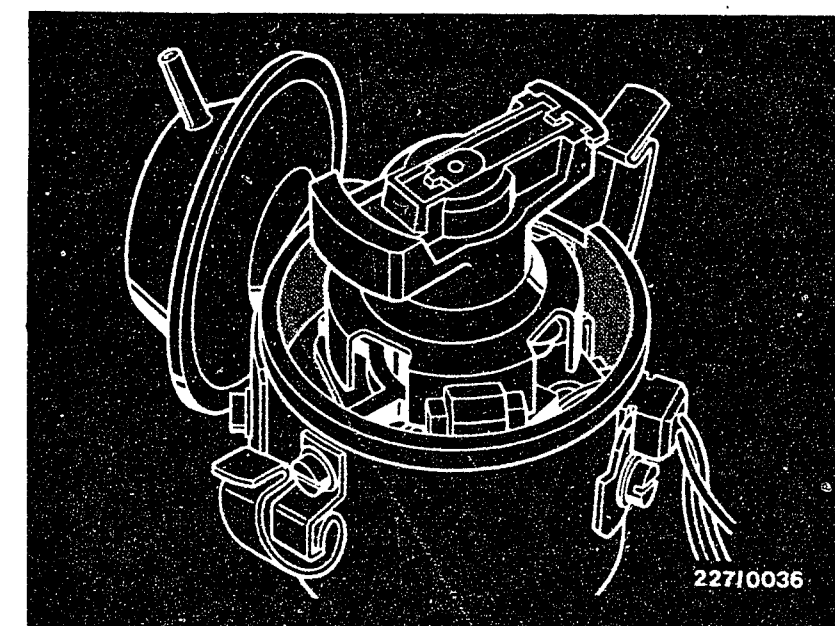
Note:

If customer complaint is still not remedied, then look for further possible faults in the fuel system, or the engine is not mechanically O.K.



- 1 = Battery
- 2 = Ignition and starting switch
- 3 = Trigger box
- 4 = Ignition coil
- 5 = Ignition distributor
- 6 = To tachometer

⚡ = Dangerous voltages
(400 V - 25 kV)



C9

Trouble-shooting program
TI-h, conversion set



C10

Trouble-shooting program
TI-h, conversion set



After-sales Service

Technical Bulletin

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22

Danger of Accident on Semi-conductor Ignition Systems

VDT-I-227/102 B

11.1976

Please be sure to pass this bulletin on to your employees for their attention.

The increased demands made on their ignition systems by modern engines, and the wish for freedom from maintenance, led some time ago to manufactures starting to equip their vehicles with semi-conductor ignition systems as original equipment. In most cases the performance of nearly all makes of such systems is higher than that of conventional systems, and further improvements are to be expected. This means that semi-conductor ignition systems have reached the point where contact with "live" parts or contacts (whether on the primary side or the secondary side) can prove fatal.

In this connection we should like to point out to you that the laws valid in your country regarding work on high-voltage systems must be adhered to when working on, or testing, semi-conductor ignition systems.

As a matter of principle, when working on such ignition systems the ignition is to be switched off. Included in such work are the following operations:

- Connection of engine testing equipment (timing light, dwell-tach tester, ignition oscilloscope etc.).
- Replacement of ignition system parts (spark plugs, ignition coil, ignition distributor, H.T. ignition cables etc.).

If it is necessary to switch on the ignition in order to test the system or make adjustments on the engine (to the carburetor for instance), then lethal voltages are present throughout the entire system.

This means that the danger of accident exists not only at individual components in the system (e.g. ignition distributor, ignition coil, trigger box, ignition harness), but also at the wiring harness (e.g. connection for the tachometer, diagnostic connector), on terminals, and on test equipment.

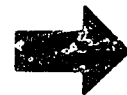
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Technical Bulletin

11-h, Conversion set

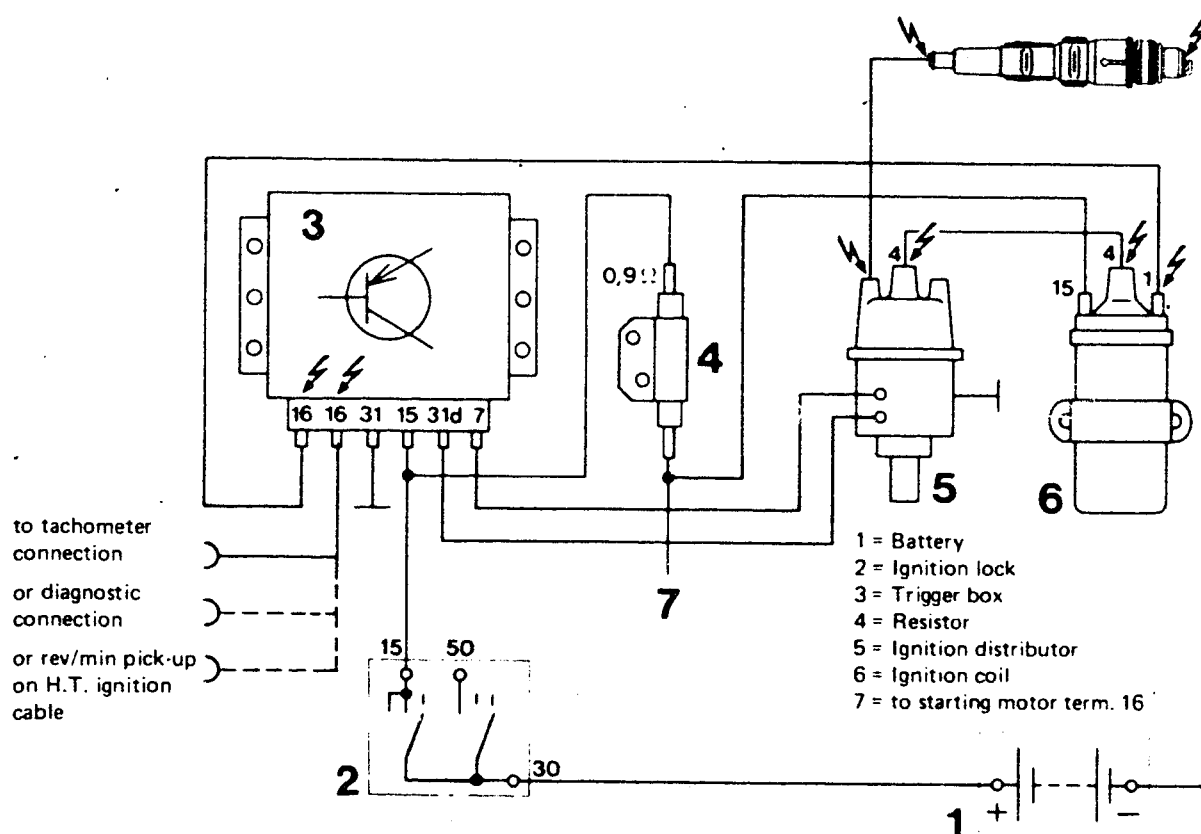


In addition, in the case of the capacitor-discharge ignition system (CDI), danger of accident is also present under the following circumstances:

- Operation of the trigger box without the ignition transformer.
- At the trigger box, (removed), relatively soon after it has been switched off (capacitor discharge).

Below is a typical terminal diagram of a semi-conductor ignition system, the danger points are marked with red high-voltage arrows. We would point out that all semi-conductor ignition systems, even the older ones, are to be regarded as dangerous in the sense as defined by this bulletin.

Please address any queries or comments concerning the contents of this publication to our representative in your country.



Terminal diagram

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Technical Bulletin

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BREAKERLESS TRANSISTORIZED IGNITION SYSTEM

22

Warranty note

VDT-I-227/103 En

Hybrid construction trigger boxes

3.1979

0 227 100 100 for ignition distributor
with Hall generator (TCI-h)
0 227 100 102 for ignition distributor
with induction-type
pulse generator (TCI-i)

Apart from the well-known TCI trigger boxes 0 227 100 0.., trigger boxes of hybrid construction have been fitted as standard since 9.78 (Fig. 1).

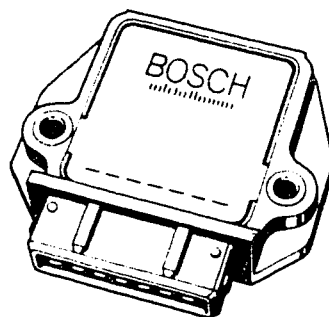


Fig. 1

Warranty procedure

If the complaints are justified, all these hybrid trigger boxes are to be sent, along with completed warranty documents, to your authorized representative for forwarding to the following address:

ROBERT BOSCH GMBH
KH/LAV - Auspackraum

zur Weiterleitung an K1/VAK 21

D-7000 Stuttgart 30

This instruction remains valid until further notice.

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Technical Bulletin

TI-h, Conversion set



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Breakerless Ignition Distributor 0 231 . . with retrofitted Hall generator

23

VDT-I-231/101 B

1. 1977

General

For the new breakerless, maintenance-free transistorized ignition system from Bosch.

Modification set for vehicles with 4-cylinder engine and Bosch ignition distributor, in some cases for vehicles as far back as the 1972 model. See also VDT-I-227/2 B, VDT-I-231/1 B and KH-Information "New breakerless, maintenance free transistorized ignition system TSZ-h".

Ignition Distributor - Modification

Lift off the distributor cap (1). Remove the distributor rotor (2) and dust-protection cover (3).

Remove distributor contact points (4).

Cut the ground connection (copper stranded wire) from the breaker-plate assembly to the distributor housing at both points of connection and remove it (see Fig. 2).

Unscrew ignition condenser (5) and remove together with connecting leads.

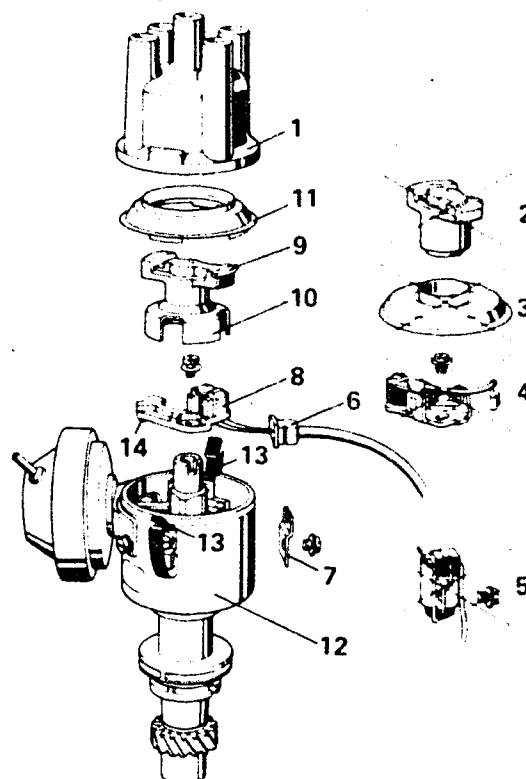


Fig. 1

Feed the leads of the ignition vane switch through the opening in the distributor from the inside and press the shaped piece (6) into the opening. The shaped piece should be so positioned that the three thin leads are in its lower half. Do not twist the leads to the vane switch. Slip the metal holder (7) into the groove in the shaped piece and screw in place with the short screw supplied. Snap the ignition vane switch (8) with locating piece (14) into the breaker-plate assembly and screw in place with the long screw provided.

- | | |
|-------------------------------|------------------------------|
| 1 = Distributor cap | 10 = Trigger wheel |
| 2 = Distributor rotor | 11 = Dust protection cover |
| 3 = Dust protection cover | 12 = Distributor housing |
| 4 = Contact point | 13 = Spring clip |
| 5 = Ignition condenser | 14 = Locating piece |
| 6 = Shaped piece | X = Parts no longer required |
| 7 = Sheet metal holder | |
| 8 = Ignition vane switch | |
| 9 = Distributor rotor with 10 | |

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Technical Bulletin

TI-h, Conversion set



Slip (snap in place) the new distributor rotor (9) with trigger wheel (10) onto the ignition-distributor shaft. Place the new dust-protection cover (11) over the distributor housing (12) and snap into place.

Fit the distributor cap and secure with the spring clips (13).

Slip the insulating tubing over the ignition vane switch leads.

Caution! The ignition vane switch will be destroyed if the polarity is wrong.

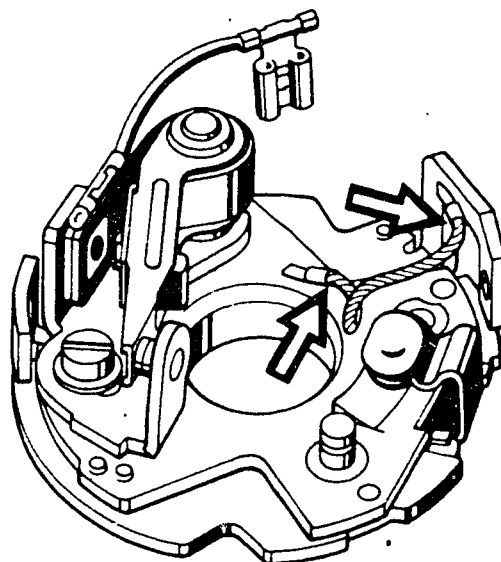


Fig. 2



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NEW DESIGNATIONS FOR IGNITION SYSTEMS

VDT-I-227/108 En

5.1981

The introduction of new ignition systems has made it necessary to reclassify all designations. The designations listed below will be used immediately in KH workshops and in sales literature.

Designation	Abbreviated code	Meaning	Switching part	Ignition control and spark advance	High-voltage distribution
Coil ignition	SZ (CI)	-----	mechanical (breaker points)	mechanical (ignition distributor)	mechanical (ignition distributor)
Transistorized coil ignition	TSZ-k (TCI-c)	k=breaker-triggered	electronic (trigger box)	mechanical (ignition distributor)	mechanical (ignition distributor)
Trigger box with traditional switching techniques	TSZ-I* (TCI-i)	I=induction type pulse generator	electronic (trigger box)	mechanical (ignition distributor)	mechanical (ignition distributor)
	TSZ-H (TCI-h)	H=Hall generator	electronic (trigger box)	mechanical ignition distributor	mechanical (ignition distributor)
Transistorized ignition (Trigger box in hybrid technique)	TZ-I* (TI-i)	I=induction type pulse generator	electronic (trigger box)	mechanical (ignition distributor)	mechanical (ignition distributor)
	TZ-H* (TI-h)	H=Hall generator	electronic (trigger box)	mechanical (ignition distributor)	mechanical (ignition distributor)

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Technical Bulletin

TI-h, Conversion set



Designation	Abbreviated code	Meaning	Switching part	Ignition control and spark advance	High-voltage distribution
Electronic ignition	EZ-L	L=characteristic curve	electronic (trigger box or control unit)	electronic (control unit)	mechanical (ignition distributor)
	EZ-F	F=ignition map	electronic (trigger box or control unit)	electronic (control unit)	mechanical (high-voltage distributor)
Distributorless semiconductor ignition	VZ-L	L=characteristic curve	electronic (control unit)	electronic (control unit)	electronic (two-spark ignition coil, or 1 ignition coil/spark plug)
	VZ-F	F=ignition map	electronic (control unit)	electronic (control unit)	electronic (two-spark ignition coil, or 1 ignition coil/spark plug)

* Please note: The ignition system can additionally be fitted with a DLS unit (digital idle stabilizer) or with an ELS unit (electronic idle stabilizer) or with an ESV unit (electronic ignition retardation).



After-sales Service

Technical Bulletin

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L-JETRONIC and
TCI-h "Hybrid"

VDT-I-280/102 En
7.1980

Please note:

TCI-h trigger boxes in hybrid construction form can not yet be fitted into vehicles with L-Jetronic.

By means of the internal current limiting of the trigger boxes, impulses are created which enter the L-Jetronic control unit from terminal 1 of the ignition coil. Because of these additional impulses more fuel is injected than is necessary.

This means therefore: higher fuel consumption,
out-of-true engine running and
bad acceleration behaviour.

A new TCI-h of the conventional kind (without internal current limiting) with part no. 0 227 100 916 has therefore been delivered for vehicles with a 4 cyl. engine with L-Jetronic.

The supplementary-equipment set 0 227 100 916 is intended at first for the following vehicles:

Opel-Kadett C	GT/E	1.9 l	}	with ignition distributor 0 231 170 154
Opel-Kadett C	GT/E	2.0 l		
Opel-Kadett Rally		2.0 l		
Opel-Manta	GT/E	2.0 l		
Opel-Rekord E		2.0 l		
VW-Beetle Automatic		1.6 l	}	with ignition distributor 0 231 170 044
				... 046
				... 048
				... 093

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Technical Bulletin

TI-h, Conversion set



After-sales Service

Motor Vehicle Service Information

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INCORRECT DISPLAY OF ROTATIONAL SPEED AND
DWELL ANGLE ONLY WITH TRIGGER BOXES
0 227 100 ... (TCI-i, TCI-h) WITH CURRENT
LIMITATION

VDT-I-Gen. 030 En
6.80
Supersedes Ed. 3.80

For additional information see VDT-I-Gen. 032 En

1. General

In comparison with conventional ignition systems, transistorized ignition systems with current limitation have different primary voltage characteristics. During the dwell period the voltage at terminal 1 of the ignition coil may assume values from 1.5 V to battery voltage (or greater). This may lead to an incorrect display of rotational speed and dwell angle when testing the ignition system. However, there is no functional defect in the ignition system, and, for this reason, the trigger box must not be replaced. Incorrect displays may occur with the testers listed below:

MOT 001.00}	Rotational-speed	KTE 001.00
001.01}	display O.K. with these	001.02
001.02	testers	001.03
001.04		
002.00		

By now, the following vehicles may be fitted with breakerless ignition systems with current limitation:

Audi	(Bosch/Fairchild- ignition system)	Mazda	(Mitsubishi ignition system)
BMW	(Bosch ignition system)	Mitsubishi	(Mitsubishi ignition system)
Citroen	(Delco ignition system)	Nissan-Datsun	(Hitachi ignition system)
Fiat	(Delco ignition system)	Peugeot	(Bosch ignition system)
Ford	(Delco ignition system)	VW	(Bosch/Fairchild ignition system)
General- Motors	(HEI-ignition system)	Bosch transistorized ignition system for retrofitting 0 227 100 920	

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Motor Vehicle Service Information
TI-h, Conversion set



2. Test instructions

2.1 Rotational speed

Incorrect rotational-speed display can be recognized as follows:

If one starts at the idle speed and slowly increases the engine speed, then the incorrect display can be recognized by an abrupt reduction in the rotational-speed display (e.g. from 2400 min⁻¹ to 1200 min⁻¹).

It is, however, possible to attain correct rot.-speed measurements as follows:

Connect a ballast resistor of 0.9 or 1.0 Ohm (see Fig.) in series in the line to term. 15 of the ignition coil (take care not to cause a short circuit). After the rotational-speed measurement, the ballast resistor must be removed (otherwise starting difficulties and misfiring). Connect tester as per operating instructions.

Suggestion for user manufacture

Required parts:

1 ballast resistor 0.9 Ohm

Part No. 0 227 900 002

or

1 ballast resistor 1.0 Ohm

Part No. 0 227 900 101

2 blade receptacles e.g.

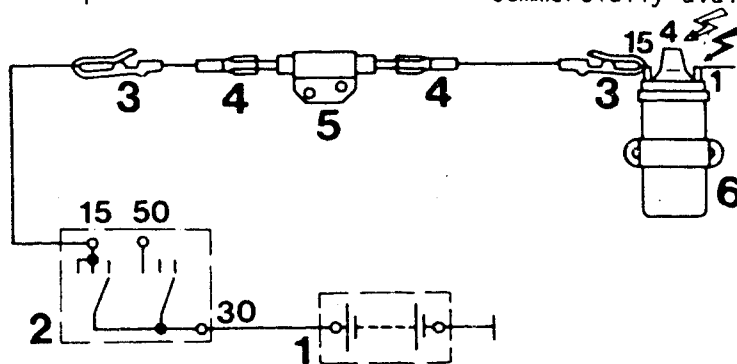
Part No. 1 901 355 881

approx. 0.2 m cable, 1.5 mm² e.g.

Part No. 6 210 150 150

2 insulated clips

Commercially available



1 = Battery

4 = Blade receptacle

⚡ approx. 400 V

2 = Ignition switch

5 = Ballast resistor

⚡ approx. 25 kV

3 = Clips

6 = Ignition coil

2.2 Dwell angle

The dwell angle is electronically controlled. A measurement of the dwell angle is no longer performed.

2.3 Ignition point

Is displayed correctly. Connect tester as per operating instructions.



After-sales Service

Motor Vehicle Service Information

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MOTORTESTER CONVERSION

Incorrect display of rotational speed,
dwell angle and ignition point
only with trigger boxes
0 227 100 ... (TCI-i, TCI-h) with current
limitation

VDT-I-Gen. 032 En
6.80

For additional information see VDT-I-Gen. 030 of 6.80

Re.: Motortester EFAW 268
268 S 10
269
214 B
AE 2000

1. General

Please make sure that the above-mentioned motortesters in your workshop and at your customers (e.g. motor vehicle workshops, oil companies, gas stations, vocational schools etc.) are converted. The conversion is subject to payment and is carried out by the K7 after-sales service of the responsible BG. The standard time is 15 work units (with fitting of switch).

2. Why motortester conversion?

In comparison with conventional ignition systems, transistorized ignition systems with current limitation have different primary voltage characteristics. During the dwell period the voltage at terminal 1 of the ignition coil may assume values from 1.5 V to battery voltage (or greater). This may lead to an incorrect display of rotational speed and dwell angle as well as to incorrect triggering of the meter when testing the ignition system. There is, however, no functional defect in the ignition system, and, for this reason, the trigger box must not be replaced. Since, with the above-listed motortesters, the timing light is triggered by the signal path dwell angle - meter, this incorrect triggering also leads to incorrect flashing and thus to an incorrect display of the advance angle.

3. Conversion measures

The situation is to be remedied by modifying the wiring of the testers so that the timing light is triggered by the clamp-on induction pickup and the pulse shaper stage.

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Motor Vehicle Service Information

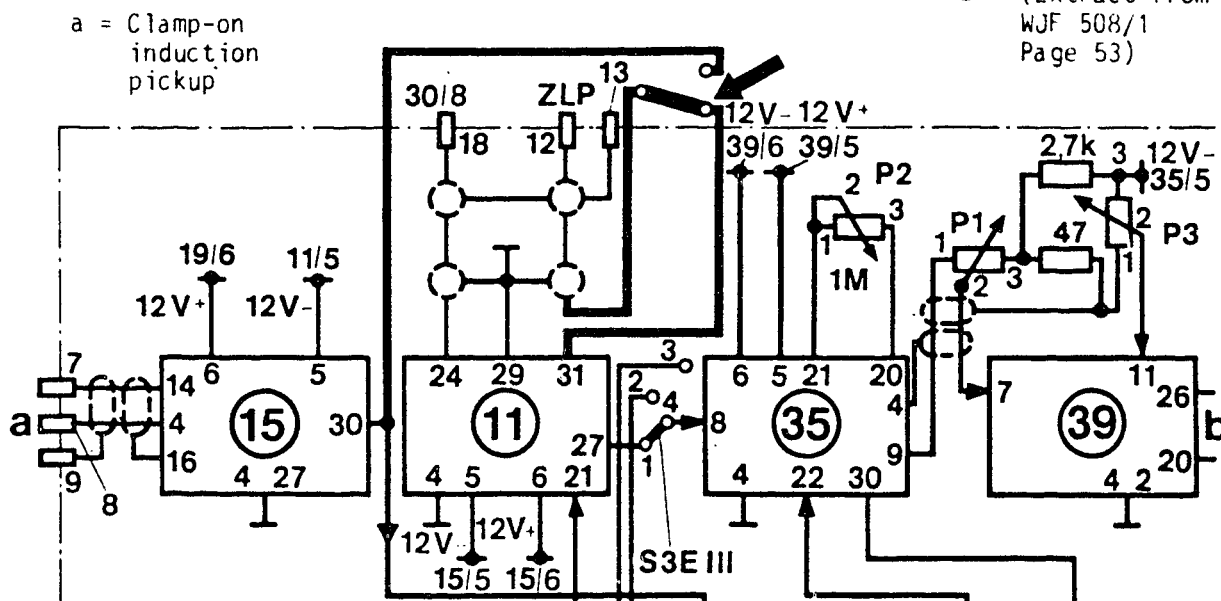
TI-h, Conversion set



Remove the line of the ZLP* from pin 31 of printed board 11 (coupling stage) and connect to pin 30 of printed board 15 (pulse shaper stage) via a switch with change-over contact (e.g. 0 341 500 803). In addition, a new line must be connected from pin 31 of printed board 11 to the other contact of the switch with change-over contact. Arrow points to switch with change-over contact.

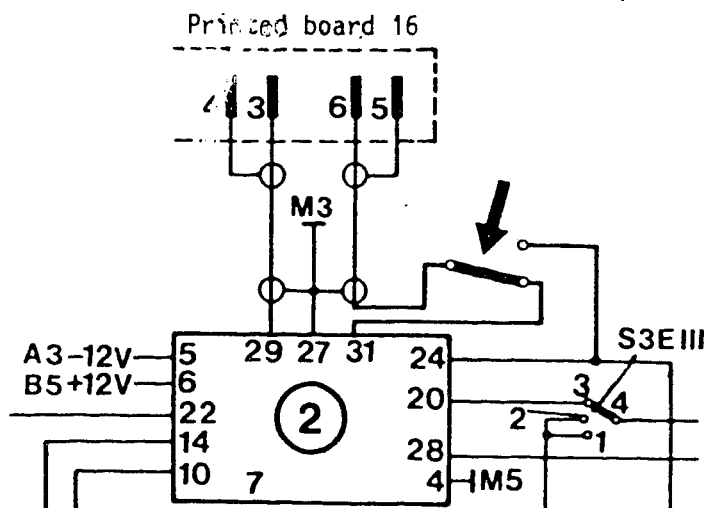
* ZLP = timing light

D = (Extract from
WJF 508/1
Page 53)



EFAW 214 B

Remove the line from terminal 6 of printed board 16 to pin 31 of printed board 2 (coupling stage) and connect to pin 31 of the same printed board via a switch with change-over contact (e.g. 0 341 500 803). In addition, a new line must be connected from pin 31 of printed board 2 to the other contact of the switch with change-over contact. Arrow points to switch with change-over contact.



(Extract from
WJF 503/1, Page 64)

By fitting the switch with change-over contact in the front panel of the motor-tester, it is possible to switch over from standard ignition systems to those with current limitation. We recommend that the switch positions be marked correspondingly: e.g. "standard" - "current limitation". These conversion measures have already been published in the K7 information sheet KJF 28/7911.



4. Test instructions

4.1 Standard ignition systems

Switch position: "standard"

All other tester connections as per operating instructions.

4.2 Ignition systems with current limitation

Switch position: "current limitation"

In order to trigger the timing light, the induction-type pulse generator (clamp-on pickup or red pickup) must always be connected during the measurement.

The selector switch for ignition systems built into the motortester must be switched to standard coil ignition (not to TCI) with these ignition systems.

All other tester connections as per operating instructions.

The dwell angle is electronically controlled. A measurement of the dwell angle is no longer performed.



After-sales Service

Motor Vehicle Service Information

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TESTS ON ELECTRONIC IGNITION SYSTEMS
(TCI, TZ)
TESTER INSTRUCTIONS

VDT-I-Gen. 035 En
3.1981

The following tests are listed in older and current Tester operating instructions or in Trouble-shooting with the oscillograph.:

- "Separate ignition coil test" (concerns EFAW 213, 214, 268, AE 2000).
- Calculating the "ignition voltage reserve" (concerns EFAW 213, 214, 268, AE 2000 and MOT series).
- "Intensified insulation test" (concerns EFAW 213, 214, 268, AE 2000 and MOT series).

Nowadays transistorized ignition systems deliver more than 30,000 V secondary voltage.

To avoid damage to ignition coil, ignition cable and ignition distributor by voltage flashovers, the tests listed above should not be carried out on transistorized ignition systems.

The contents of this Service Information has already been published in the K7-Information K7-VJF 17/8012.

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Motor Vehicle Service Information
TI-h, Conversion set



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TCI-h, conversion kit



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